STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

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DESCRIPTION **S.D.D. NUMBER**

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SECTION 1 - GENERAL REQUIREMENTS

1.1 DEFINITIONS AND TERMS

City. The City of Fitchburg, Wisconsin.

City Contract. The written agreement between the City and the Contractor setting forth the obligation of the parties thereunder, including, but not limited to; the performance of the work to be done, the furnishing of labor and materials, the basis of payment, and contract time. Other contract documents are incorporated into the Agreement.

Contractor. The individual or entity with whom Owner has entered into the Agreement.

Department. The City of Fitchburg Public Works Department.

Developer. The individual, partnership, joint venture, corporation or agency undertaking public improvements under the terms of the Developer's Agreement and acting directly or through a duly authorized representative.

Developer's Agreement. The agreement between the City of Fitchburg and the Developer setting forth the obligation of the parties thereunder for public improvements.

Developer's Engineer. The consulting engineer retained by the Developer and acting as the Developer's representative.

Engineer. The City Engineer of the City of Fitchburg acting personally or through a duly authorized representative.

Inspector. A representative of the Engineer assigned and authorized to make detailed inspection of any and all portions of the work or materials.

Materials. Any substance specified for use in the construction of the project and its appurtenances.

Plans. The approved plans, profiles, typical cross sections, and other drawings identified in the contract documents, which show the location, character, dimensions, and details of the work to be done.

Project. The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

Project Area. The location of the construction to be performed under the contract.

Shop Drawings. All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

Special Provisions. Special directions, provisions, or requirements peculiar to the project under consideration and not otherwise detailed or set forth in the Standard Specifications.

Specifications. The directions, provisions, and requirements contained and referenced herein, together with written agreements and documents incorporated in the contract documents, pertaining to the method or manner of performing the work, the quantities, and the quality of materials to be furnished under the contract.

Standard Specifications. That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

Subcontractor. An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

Supplemental Specifications. Specification adopted subsequent to the publication of these specifications.

Undistributed Quantity. A certain estimated amount of an item of work where the location is not yet determined. The work could take place anywhere within the City of Fitchburg municipal boundary.

Work. The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

1.2 GENERAL REQUIREMENTS

1.2.01 RELATED DOCUMENTS

Specifications shall consist of the City of Fitchburg Standard Specifications for Public Works Construction latest edition (hereinafter referred to as "Fitchburg Specifications") and the State of Wisconsin Standard Specifications for Highway and Structure Construction latest edition (hereinafter referred to as "WisDOT Specifications"), except as modified herein. Where there is conflict between the Fitchburg Specifications and the WisDOT Specifications, the Fitchburg specifications shall govern.

Standard Specifications shall reference the *Standard Specifications for Sewer and Water Construction in Wisconsin, latest edition*, (hereinafter "WUCA Specifications") except as modified herein. Where there is a conflict between Fitchburg Specifications and the WUCA Specifications, Fitchburg Specifications shall govern.

1.2.02 PRE-CONSTRUCTION CONFERENCE

A pre-construction conference for the representatives of the Contractor and the City shall be held before the Contractor proceeds with the construction. The conference shall be arranged by the Contractor and shall be held at Fitchburg City Hall to discuss the project schedule and potential concerns of the City residents.

1.2.03 PERMITS

The Contractor shall be responsible for obtaining all necessary permits needed for construction. These permits shall include, but shall not be limited to: Street Opening Permit, Erosion Control and Storm Water Management Permit (ECSWM), Driveway Permit, Bulk Water Use Permit, and Flushing Permit. These permits may be obtained on the 3rd floor at Fitchburg City Hall, from the Public Works Department. The work associated with these permits shall be completed in accordance with all applicable statutes, ordinances, rules and regulation of the state and the City.

1.2.04 SHOP DRAWINGS

All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared by or for the Contractor or Developer's Engineer, or by subcontractor, manufacturer, fabricator, or supplier, which the Contractor is required to submit to the Engineer for approval.

1.2.05 PROTECTION OF PROPERTY IRONS AND MONUMENTS

The Contractor shall be responsible for protecting and preserving all property irons and monuments during construction. At the completion of the project, the City will hire a Registered Land Surveyor (RLS) to reset all lost irons and monuments not replaced by the Contractor's RLS. The Engineer shall determine which irons and monuments were lost due to the Contractor's (or Contractor's subcontractor's) negligence, and shall, in addition to penalties under law, withhold up to $1000 for each lost or damaged iron and $2000 for each lost or damaged monument from the Contractor's payment as a deposit. Once the actual costs of repair and/or replacement are determined, the actual costs shall be deducted from the Contractor's final payment. Under circumstances where the Contractor is performing work as part of a developer's agreement, the actual costs shall be invoiced to the Developer.

All new and existing property irons within the development shall be marked with steel fence posts. Steel fence posts shall extend five feet (5') above ground surface.

1.2.06 DRAWING SUBMISSIONS

One set of 24" x 36" Mylar copies and a digital file of the record drawings on a CD shall be delivered to the Engineer within three (3) months of acceptance of the work. All coordinates shall be in the Dane County Coordinate System, NAD 83(1991), US Survey Feet. All elevations shall be referenced to NAVD 88, Feet. Elevations based on the City of Madison, Lake Mendota Datum will not be accepted. The digital file of the record drawings shall be in AutoCAD format and shall include a plan layout of the entire project and plan and profile layouts utilizing the Dane County Coordinate System. All layers in the digital file shall have names consistent with the National CAD Standard. An AutoCAD template drawing is available from the Public Works Department. Along with the above submittals provide two points, at opposite corners of the project, in Dane County Coordinates and in Universal Transverse Mercator Coordinates of an existing, easily recognizable, and immobile object (fire hydrant, street light, etc.). In the event that accurate record drawings are not submitted in a timely fashion, the Engineer reserves the right to restrict commencement of subsequent project phases and/or assess the Developer for actual expenses incurred for creation of such drawings.

Contractor's construction notes, as well as televised sewer and survey information shall be incorporated into the record drawings. The Contractor shall maintain in a safe place one (1) copy of all drawings with construction notes, for the use of generating record drawings, which include the measurements listed below. Sewer lateral locations at the main, as indicated on the sewer televising report, shall be incorporated into the record drawings. All exposed utilities and all visible changes made to City infrastructure during construction shall be re-surveyed. The re-surveyed record drawing information for all utilities shall include the location, elevations, and adjusted pipe slopes, if applicable, for all utility infrastructure. Applicable elevations include, but are not limited to, rim elevations, pipe invert elevations, and top hydrant nut elevations.

Contractor's construction notes shall include all changes made during construction, locations and depth of any abandonments, and the measurements listed below. Failure of Contractor to

provide required construction notes shall result in a 5% deduction in contract price for the installation and materials of each utility construction notes are not provided for.

A. Storm Sewer. A complete and accurate tabulation of length and depths of all storm sewers shall be kept by Contractor. Depths of all storm sewer pipe inverts at each structure shall be recorded (distance between invert of each pipe and top of curb).

B. Water Main. A complete and accurate tabulation of the length, depth and location of all water main fittings, laterals, corporations and curb stops shall be kept by Contractor. All buried utility fittings shall be tied to two permanent landmarks such as valves, manhole castings, property irons, etc. For water services the distance from main to curb stop and the curb stop to end of the service shall be recorded.

C. Sanitary Sewer. A complete and accurate tabulation of length, depth and location of all sewer branches, risers, laterals, and wyes shall be kept by Contractor. Measurement shall be made from the nearest downstream manhole, or equivalent permanent landmark.

The following information for each listed item shall be placed in a Dbase IV or ASCII table and provided to the City within three (3) months of acceptance. All coordinates shall be in the Dane County Coordinate System, NAD 83(1991), US Survey Feet. All elevations shall be referenced to NAVD 88, Feet. Elevations based on the City of Madison, Lake Mendota Datum will not be accepted.

Item	Dbase IV or ASCII Table Information
Sanitary Sewer Structures	Feature Number, Type of Feature, Year of Installation, Street, Easting, Northing, Rim Elevation, Invert Elevation
Sanitary Sewer Pipe	Feature Number, Type of Feature, Year of Installation, Street, Invert Elevation, Pipe Material, Pipe Size, Pipe Length, Slope, Up Stream Manhole
Sanitary Sewer Lateral	Feature Number, Type of Feature, Year of Installation, Street, Invert Elevation, Pipe Material, Pipe Size, Pipe Length, Slope, Up Stream Manhole, Distance from upstream manhole to lateral
Storm Manholes	Feature Number, Type of Feature, Year of Installation, Street, Easting, Northing, Rim Elevation, Invert Elevation
Storm Pipe	Feature Number, Type of Feature (box culvert, feeder, main, etc.), Year of Installation, Street, Invert Elevation, Pipe Material, Pipe Size, Pipe Length, Slope, Up Stream Manhole
Storm Outfalls	Feature Number, Type of Feature, Year of Installation, Street or nearest street, Easting, Northing, Invert Elevation, Size, Material, Endwall (Y/N), Grate (Y/N), Treatment (Riprap, Grass Swale, Gabion, etc.)
Storm Inlets	Feature Number, Type of Feature (H, Beehive, Field, Driveway, etc.) Year of Installation, Street, Easting, Northing, Rim Elevation, Invert Elevation
Water Valves	Feature Number, Type of Feature (Gate, Butterfly, Service, etc.) Year of Installation, Street, Easting, Northing, Rim Elevation, Cover (Valve Box, Manhole, Curb Stop), Purpose (Main, Service, Hydrant), Size, Material
Water Main Pipe	Feature Number, Type of Feature, Year of Installation, Street, Invert Elevation, Pipe Material, Pipe Size, Pipe Length
Water Main Bends	Feature Number, Type of Feature, Year of Installation, Street, Easting, Northing, Invert Elevation, Pipe Material, Pipe Size, Pipe Length, Degree, Orientation (Horizontal or Vertical)
Fire Hydrants	Feature Number, Type of Feature, Year of Manufacture, Street, Easting, Northing, Top Nut Elevation, Address (if known)
Water Service Laterals	Feature Number, Type of Feature, Year of Installation, Street, Invert Elevation, Lateral Material, Lateral Size, Lateral Length (Main to Service Valve), Address (if known)

1.2.07 PLANT VALUES SUBMISSIONS

A copy of the final construction costs, broken down per item, shall be submitted to the Engineer by December 15 of the year in which the construction is completed.

1.2.08 ACCEPTANCE OF IMPROVEMENTS

When the Contractor considers the entire work completed, the Contractor shall notify the Engineer in writing that the work is complete and request that the Engineer conduct an inspection of the work. Within a reasonable time thereafter, the Contractor and the Engineer shall make an inspection of the work to determine the status or completion. If the Engineer does not consider the work to be complete or satisfactory in any way, the Engineer will notify the Contractor in writing of the reasons. At that time, any defects or imperfections that appear in the whole or any part of the work, which are caused by or due to any fault or negligence of the Contractor, shall be corrected before the work is accepted. Upon completion of the work to repair the defects and/or imperfections of the Contractor, the Contractor shall notify the Engineer in writing that the work has been completed. If, upon inspection, the work is found to be satisfactory and complete by the Engineer, and the other requirements listed herein have been met, the project will be considered accepted. At the discretion of the Engineer, conditional acceptance may be granted prior to the completion of the asphaltic surface course.

No project shall be accepted prior to Contractor's submission of final lien waivers for Contractor and Contractor's subcontractors.

No project shall be deemed complete until all excess mud, bituminous material, and other objectionable material are removed from the sidewalk, terrace, gutter, and pavement; inlets and storm sewers cleaned, and erosion control measures in place.

No building permits shall be issued for the subject project prior to acceptance (or conditional acceptance) by the Fitchburg Common Council of the public improvements associated with the project.

1.2.09 GUARANTEE OF WORK

Unless otherwise stated in the special provisions, the Contractor shall guarantee the work related to all public improvements for a period of one (1) year from the date of final acceptance.

1.2.10 TRAFFIC CONTROL

When the project work is on or adjacent to an active roadway, vehicular and pedestrian traffic shall be maintained at all times, unless specifically permitted by the Engineer. The Contractor shall notify the Fitchburg -Public Works Department (270-4260) a minimum of 72 hours in advance of any planned detours or other roadway work that may impede the movement of emergency vehicles. The Contractor shall cooperate in notifying any affected businesses or residents.

All work shall be in conformance with the latest edition of the Manual of Uniform Traffic Control Devices (MUTCD) and the appropriate supplements for its use in the State of Wisconsin, and these specifications. This manual is available at http://mutcd.fhwa.dot.gov/.

All traffic control barricades shall be weighted down with sand bags or other approved methods. $200 per day shall be deducted from Contractor's total contract price for traffic control that is not maintained per MUTCD requirements.

Contractor is responsible for maintaining visible stop signs during all construction phases.

1.2.11 STREET CLOSING NOTIFICATONS

All Contractors performing work on City contracts or as a part of a developer's agreement shall give the Engineer notice of their intent to begin work on any City street a minimum of 48 hours in advance of commencing operations. If it is deemed necessary by the Contractor that a detour be used during the duration of the project, the Engineer shall be given at least 72 hours notice. Saturdays, Sundays, and legal holidays shall not be included in the measurement of notice time. Further notice shall be given of any major change in project scheduling following the original notification.

The Contractor shall not in any manner unnecessarily obstruct the streets or crossing, and shall, under all circumstances, provide safe and sufficient means of travel for pedestrians and vehicles.

The Contractor shall not, at any time, close any street to the public except by express permission of the Engineer. When closure of the roadway has been permitted, the Contractor shall notify the Engineer at the earliest possible date so that arrangement may be made for closing the street and providing detours if possible.

1.2.12 TESTING AND SAMPLING

All materials shall be subject to testing, and shall be tested if so ordered by the Engineer. The Contractor shall furnish without charge all samples and such facilities necessary for the collection and forwarding of such samples. Unless otherwise specified elsewhere herein, all testing shall be completed by the City's subcontractor. When applicable, the contractor shall use the City's standard testing forms.

1.2.13 MATERIALS

All materials used in construction shall be new materials unless otherwise approved by the Engineer. The Contractor is responsible for ensuring all materials on site meet City Standards.

END

SECTION 2 - EROSION CONTROL

2.1 GENERAL

2.1.01 RELATED DOCUMENTS

Wisconsin DOT Erosion Control Product Acceptability List (PAL), latest edition available at http://www.dot.wisconsin.gov/business/engrserv/pal.htm

Dane County Erosion Control & Stormwater Management Manual available at http://www.danewaters.com/pdf/manual/ecsm_manual.pdf and the Wisconsin DNR Technical Standards available at http://dnr.wi.gov/topic/stormwater/standards/const_standards.html

City of Fitchburg Erosion Control and Stormwater Management Permit Application available at www.fitchburgwi.gov/stormwater

2.1.02 DESCRIPTION OF WORK

There are a variety of strategies for minimizing soil loss from construction sites. These include preventing soil detachment, diverting runoff around disturbed areas, and trapping sediment carried by runoff before it leaves the site. The most important strategy for controlling construction site erosion is preventing soil particle detachment through soil stabilization. Vegetation should be reestablished as soon as possible after land is disturbed. In the meantime, other erosion control practices, such as polymer application, erosion matting, and mulching, must be in place. A second line of defense is to prevent runoff from contacting detached soil particles by diverting runoff around disturbed areas. Diversions minimize the opportunity for runoff to entrain detached soil particles and carry them offsite. Finally, when soil particles are detached and carried by runoff, practices that slow and/or trap sediment must be installed to prevent suspended sediment from leaving the site and entering water bodies.

2.2 MATERIALS

2.2.01 EROSION CONTROL MATERIALS

Erosion control materials shall conform to the WisDOT PAL or as specified in the Dane County Erosion Control and Stormwater Management Manual unless otherwise approved in writing by the Department.

2.3 EXECUTION

2.3.01 EROSION CONTROL PERMIT REQUIRED ON SITE

Contractor shall maintain a copy of the approved Erosion Control and Stormwater Management Permit on-site at all times until final stabilization of the project is achieved.

2.3.02 EROSION CONTROL INSTALLATION, MONITORING, MAINTENANCE, & REMOVAL

The installation, monitoring, maintenance, and removal of erosion control shall conform to the Dane County Erosion Control and Stormwater Management Manual unless otherwise approved by the Department.

END

SECTION 3 - EARTHWORK AND RESTORATION

3.1 GENERAL

3.1.01 RELATED DOCUMENTS

City of Fitchburg Tree Protection and Pruning Guidelines

3.1.02 DESCRIPTION OF WORK

Earthwork includes clearing and grubbing, excavation, fill, compaction, and grading of material to meet the subgrade elevations indicated and subsequent disposal of surplus materials from the project. Restoration includes the provision and placement of topsoil, seed, fertilizer, and mulch for the disturbed areas within the project.

3.1.03 SITE CONDITIONS

A. Existing Utilities. Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.

Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

B. Protection of Existing Trees and Vegetation. Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line.

Where indicated on drawings, Contractor shall provide temporary measures to protect trees and vegetation to be left standing. Temporary measures shall be installed prior to the start of construction. All unidentified trees with drip lines in the construction zone shall be reported to the City prior to the commencement of construction activities. Contractor shall follow the City of Fitchburg Tree Protection and Pruning Guidelines.

C. Protection of Persons and Property. Barricade open excavations occurring as part of this work and post warning lights. Operate warning lights as recommended by authorities having jurisdiction. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout and other hazards created by earthwork operations.

3.2 MATERIALS

3.2.01 BACKFILL AND FILL

Satisfactory soil materials free of clay, rock or gravel larger than two (2) inches in any dimension, debris, waste, frozen materials, vegetable and other deleterious matter. Materials shall be provided that will meet the compaction requirements set forth in Section 3.3.05.

3.2.02 SELECT FILL

Processed or selected natural materials consisting of sand, a mixture of sand with gravel, crushed stone, or crushed concrete, more generally identified as pit run sand, pit run sand and gravel, crushed stone base course, and crushed concrete. The gradation of the material shall meet the following limits:

SELECT FILL GRADATION

Sieve Size	Percentage Passing by Weight
6-inch	100
3-inch	85
No. 4	25

3.2.03 GEOTEXTILES

A. Beneath Pavement. Construction fabric shall be a pervious sheet of yarn non-woven into a uniform pattern with distinct and measurable openings. Geotextile shall be Mirafi 1100N, TNS R100, or equal. Any alternative fabric must have the Engineer's approval prior to use.

B. Beneath Rip-Rap. Geotextile fabric shall be Type R and shall be provided in accordance with Section 645 of the Standard Specifications.

3.2.04 RIPRAP

Unless noted otherwise on plans, medium riprap shall be provided and shall be underlined with a geotextile fabric. The materials shall conform to the requirements of Section 606 of the WisDOT Specifications or as directed by the Engineer.

3.2.05 TOPSOIL

Humus bearing soil, commonly known as black dirt, free of subsoil, clay, lumps, stones, and other objects over two (2) inches in diameter, and without weeds, roots, and other objectionable materials.

3.2.06 SEED

A. Turf Grass Seed Mix for Sunny to Partial Shade Areas. Seed mixture shall match the following chart or approved equal and be seeded at a rate of 5 lbs/1000s.f.

Common Name	% by weight
Grasses	
Creeping Red Fescue	25.0%
Turf-Type Perennial Ryegrass	25.0%
Kentucky Bluegrass	50.0%
	100.00%

B. Turf Grass Seed Mix for Shady Areas. Seed mixture shall match the following chart or approved equal and be seeded at a rate of 5 lbs/1000s.f.

Common Name	% by weight
Grasses	
Creeping Red Fescue	20.0%
Turf-Type Perennial Ryegrass	20.0%
Hard Fescue	20.0%
Chewings Fescue	20.0%
Kentucky Bluegrass	20.0%
	100.00%

C. Ditches. Seed mixture shall be No. 40 per Section 630.2 of the WisDOT Specifications.

D. Ponds, swales, and bioretention facilities. Seed mixture shall be native vegetation as specified in the Special Provisions.

3.2.07 FERTILIZER

Fertilizer shall be Type B per Section 629 of the WisDOT Specifications.

3.2.08 MULCH

A. Cellulose Mulch. Mulch shall be cellulose hydraulic fiber mulch as approved by Engineer.

B. Loose Straw Mulch. Loose straw mulch shall be derived from wheat, oats, rice, or barley and shall be weed-free. Weed-free hay derived from native grasses is also acceptable. Use of hay derived from alfalfa is not allowed.

3.2.09 EROSION MAT

Erosion Mat shall meet Class I, Urban, Type A (Excel SR-1 All Natural or approved equal) for non-channel areas and Class II, Type C (RoLanka's BioD-Mat 70 or approved equal) for channel areas. Biodegradable plastic erosion mat stakes are preferred. If ground conditions do not allow, metal stakes may be used**.** Erosion mat is necessary for all slopes steeper than 5:1 with class of mat specified by Engineer.

3.2.10 RETAINING WALLS

A. Boulder Wall. The boulders shall be round field stone. The stone shall consist of varying sizes and weights. The minimum weight shall be 250 pounds.

B. Modular Block Wall.

1. Masonry units shall be Keystone Retaining Units, or equal, as manufactured by Madison Block and Stone in accordance with ASTM C90 and ASTM C140.

2. Masonry units shall have a minimum 28-day compressive strength of 3,000 psi. The concrete shall have a maximum moisture absorption of 8%.

3. Standard units shall be classic straight split face, 8 inches high by 18 inches wide. Top row of units shall have a smooth face. Color of units to be selected by Owner.

4. Connecting pins shall be 1/2-inch diameter thermoset isopthalic polyester resin-poltruded fiberglass reinforcement rods. Pins shall have a minimum flexural strength of 128,000 psi and short beam shear of 6,400 pounds per ASTM D4475.

5. Base levelling pad material shall be 6 inches of compacted crushed stone, 3/8 inch to 3/4 inch. Pea gravel shall not be allowed.

6. Unit fill shall be free draining, well graded crushed stone, 3/8 inch to 3/4 inch, with no more than 5% passing the No. 200 sieve.

3.3 EXECUTION

3.3.01 SITE CLEARING

A. General. Remove tree, shrubs, grass and other vegetation, improvements, or obstructions interfering with installation of new construction. Remove such items elsewhere on site or premises as specifically indicated. Remove and legally dispose of all stumps and roots that are not suitable for backfill material within the right-of-way.

When removing trees, special care shall be taken so as not to damage surrounding private property.

Trees and shrubs marked for removal on the plans shall not be replaced. Contractor shall replace all other removed and damaged trees, bushes and shrubs within the project limits with new stock at Contractor's expense. New trees shall be located as requested by Engineer. If the bush or shrub is damaged, or dies after restoring, Contractor shall replace it with one of same kind and size up to a height of four (4) feet. Bushes and shrubs beyond this height shall be replaced with one of same kind and height of four (4) feet.

B. Tree Protection. Carefully and cleanly cut roots and branches of trees indicated to be left standing, where such roots and branches obstruct new construction.

Trees which are damaged during construction shall be repaired. Contractor shall retain the services of a professional nurseryman who is a member of the National Arborist Association to direct him on the proper repair of damaged trees. Damaged limbs and roots shall be pruned or dressed according to recommendations of the nurseryman. Backfill shall be replaced as soon as possible to reduce exposure of roots to air. Scarfed areas on trees shall be suitably dressed.

C. Topsoil Stripping. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.

1. Remove heavy growths of grass from areas before stripping.

2. Where trees are indicated to be left standing, stop topsoil stripping a sufficient distance to prevent damage to main root system.

Stockpile topsoil in storage piles in areas shown, or where directed. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent wind-blown dust.

3.3.02 EXCAVATION

Unless otherwise specified with appropriate bid items, excavation is unclassified, and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.

When excavation has reached required subgrade elevations, notify the Engineer who will make inspections of conditions. Engineer shall check subgrade elevations and perform a test roll prior to placement of base course. If unsuitable bearing materials are encountered at required subgrade elevations, Contractor shall carry excavations deeper and replace excavated material as directed by Engineer.

Base course placed on unstable foundation shall be removed and replaced following undercut of the affected area, all at Contractor's expense.

Undercut areas shall be backfilled with select crushed material per SECTION 5 - PAVEMENTS and, where requested by Engineer in the field, shall be lined with geotextile material. Tapered edges shall be provided for all undercut areas as directed by Engineer.

Slope sides of excavations shall comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.

Maintain sides and slopes of excavations in safe condition until completion of backfilling.

Stockpile satisfactory excavated materials where directed until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.

Locate and retain soil material away from edge of excavations. Do not store within drip line of trees indicated to remain.

A. Excavation for Structures. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10", and extending a sufficient distance from footings and foundations to permit placing and removal of concrete form work installation of services, other construction, and for inspection.

B. Excavation for footings and foundations. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.

C. Excavation for Pavements. Cut surface under pavements to comply with cross-sections, elevations and grades as shown. Excavation shall be completed in such a manner as to ensure six (6) inches of crushed aggregate base course is placed on the subgrade, by the end of the working day.

D. Pulverize Pavement. Contractor shall pulverize the full-depth existing asphalt surface. The pulverized material shall be used as part of the road base. Any surplus grindings shall be hauled to a City designated site, by the Contractor. All limits for the pulverized area shall be sawcut to provide butt joints at intersecting streets and driveways.

3.3.03 DISPOSAL OF WASTE MATERIALS

Remove waste materials and unsuitable and excess topsoil from Owner's property and dispose of off-site in a legal manner. Burning on Owner's property is not permitted.

3.3.04 BACKFILL AND FILL

Place acceptable soil material layers to required subgrade elevations, for each area classification listed below. Contractor shall backfill excavations as promptly as work permits.

A. In excavations, use satisfactory excavated or borrow material.

B. Under grassed areas, use satisfactory excavated or borrow material.

C. Under walks and pavements, select fill for the first three (3) feet below pavement surface and satisfactory excavated or borrow material below the first three (3) feet that will meet the compaction requirements.

D. Under building slabs, use granular backfill material.

3.3.05 COMPACTION

Control soil compaction during construction providing minimum percentage of density specified for each area classification.

Compact soil to not less than the following percentages of maximum dry density for soils which exhibit a well-defined moisture density relationship (cohesive soils) determined in accordance with ASTM D 1557; and not less than the following percentage of relative density, determined in accordance with ASTM D 2049, for soils which will not exhibit a well-defined moisture-density relationship (cohesion less soils).

A. Structures and Pavements. Compact top three (3) feet of backfill or fill material at 95% relative density and all layers below three (3) feet at 90% maximum density.

B. Lawn or Unpaved Areas. Compact top six (6) inches of subgrade and each layer of backfill or fill material at 85% maximum density for cohesive soils and 90% relatively density for cohesion less soils.

C. Walkways. Compact top three (3) feet of backfill or fill material at 95% relative density and all layers below three (3) feet at 90% maximum density.

D. Pulverized Pavement. To achieve compaction, Contractor shall water and roll the pulverized material using a vibrating sheepsfoot roller.

Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material. Apply water in manner to prevent free water appearing on surface during or subsequent to compaction operations.

Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by disking, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.3.06 GEOTEXTILES

Geotextiles shall be placed as requested by the Engineer to stabilize subgrade areas. Construction fabric shall be installed in accordance with the manufacturer's

recommendations. Vibratory compaction shall not be used in the compaction of base course in areas where construction fabrics are used.

3.3.07 TOPSOIL

Topsoil shall be placed and spread at a uniform depth. If no depth is shown, place and spread topsoil to a minimum depth of six (6) inches.

3.3.08 FINE GRADING

Uniformly grade areas that are called out for restoration. Break down all clods and lumps within the topsoil, using the appropriate equipment, to provide a uniformly textured soil. A smooth finished surface shall be provided within a tolerance of +/- ½".

3.3.09 SEED RESTORATION

All areas disturbed by street, utility, curb and gutter, and sidewalk construction, shall be restored. Backslopes adjacent to the sidewalk shall be seeded to the slope intercept.

Seeding shall be performed in accordance with Method A or a modified Method B of Section 630 of the WisDOT Specifications and applied at a rate of 5 lb/1000 sf.

Hydromulching shall be performed in accordance with Method B, of Section 630 of the WisDOT Specifications, modified to include a mulching material. If Method B is used for seeding, seed and fertilizer shall be included in the tank with the mulch. Mulch shall be applied at a rate of 2000 pounds per acre.

For restoration of areas under 50 square feet, loose straw may be hand scattered uniformly over the seeded area in lieu of hydromulching.

3.3.10 RETAINING WALLS

A. Boulder Wall. In areas as generally shown on the drawings and as specifically noted in the field by the Engineer, contractor shall construct boulder retaining walls.

The stone shall be placed randomly. The larger stone shall be placed at the bottom. The minimum batter shall be three (3) inches in one vertical foot unless otherwise allowed by Engineer. Geotextile fabric shall be installed behind the wall to prevent the backfill from eroding through the joints and courses. Backfill shall meet the requirements of Section 209 of the Standard Specifications. The layout of the wall shall be approved by Engineer prior to construction of the wall. A suitable foundation, as approved by Engineer, shall be provided to preclude settlement. The wall may be constructed in conjunction with the new embankment. Some chinking may be required to secure stability of the stones.

B. Modular Block Retaining Wall. Modular wall units shall be constructed in accordance with the following standards:

- ASTM C90 - Load Bearing Concrete Masonry Units.
- ASTM C140 - Sampling and Testing Concrete Masonry Units.
- ASTM D4475 - Apparent Horizontal Shear Strength of Pultruded Reinforced Plastic Rods by the Short-Beam Method.
- ASTM D2339 - Strength Properties Adhesives in Two-Ply Wood Construction in Shear by Tension Loading.

The first course of wall units shall be placed on the base levelling pad. The units shall be checked for level and alignment. Bottom of wall shall be a minimum of 12 inches below finished grade.

Units shall be placed side by side for full length of wall alignment. Alignment may be done by a string offset or offset from sidewalk.

Units shall be interlocked with noncorrosive fiberglass pins. Pins shall protrude into adjoining courses above a minimum of one (1) inch. Two pins require per unit.

Unit fill shall be placed directly behind the wall to a minimum width of 12 inches.

All voids inside and between units and drainage zone behind units shall be filled with tamped unit fill material.

3.3.11 MAINTENANCE

Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.3.12 RIP RAP

Riprap shall be underlined with a geotextile fabric and shall be placed at the ends of pipe outfalls as shown on the plans or as directed by the Engineer in accordance with Section 606 of the WisDOT Specifications. Geotextile fabric shall be installed per the manufacturer's recommendations and in accordance with Section 645 of the WisDOT Specifications. Geotextile fabric shall extend a minimum of two (2) feet under apron endwalls.

3.3.13 UTILITY LINE OPENINGS (ULO's)

This work consists of excavating to uncover utilities for the purpose of determining elevation and potential conflict as shown on the plans or as directed by the Engineer in the field. The excavation shall be done in such a manner that the utility in question is not damaged, and the safety of the workers is not compromised. The utility line openings shall be performed as soon as possible and at least three (3) days in advance of proposed utility or street construction to allow any conflicts to be resolved with a minimal disruption. Where utilities are within six (6) feet of each other at a proposed storm sewer crossing, only one ULO shall be called for. In these cases, a single ULO will be considered full payment to locate multiple utilities. All utility line openings shall be approved and coordinated with the Engineer.

END

SECTION 4 - CONCRETE AND CONCRETE STRUCTURES

4.1 GENERAL

4.1.01 RELATED DOCUMENTS

4.1.02 DESCRIPTION OF WORK

This section includes the provision and placement of concrete for curb and gutter, traffic medians, sidewalk, concrete driveways and related appurtenances including detectable warning fields.

4.2 MATERIALS

4.2.01 CONCRETE

Concrete materials shall be provided in accordance with the requirements of Section 501 of the WisDOT Specifications.

The concrete shall be six (6) bag, air-entrained concrete as supplied by a reputable ready-mix supplier and be designed to obtain 4,000 psi in 28 days.

All concrete shall be air-entrained and shall contain seven (7) percent air by volume, plus or minus 1.5%.

Special High Early Strength (SHES) concrete shall conform to Section 416 of the WisDOT Specifications.

Addition of water to concrete on site is prohibited.

Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Engineer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Engineer before using in work.

Concrete color for cycle tracks shall be DCS Green w/ Grey Cement #100 or as approved by Engineer.

4.2.02 EXPANSION JOINT FILLER MATERIAL

Expansion joint filler shall be furnished in lengths equal to the joint width and to the thickness and height that is required. Use of multiple filler sections at a joint, street light base, valve box, or manhole to achieve required length, height, and/or thickness is prohibited. EpoFoam joint filler to be used around all valve boxes, light bases, manholes and hydrants in the concrete. Seal the top ¼" with manufacturer specified NP-1 Sonoelastic caulk.

4.2.03 DETECTABLE WARNING FIELDS

Detectable warning fields shall be Neenah Foundry's Detectable Warning Plate R-4984, natural finish or approved equal cast iron plate. The detectable warning fields shall consist of a combination of panels to meet the specified length and width for the warning field area.

The color of the detectable warning fields shall be natural patina unless otherwise specified in plans.

4.3 EXECUTION

4.3.01 GENERAL CONCRETE

Placement of concrete shall conform to the requirements of Section 415 of the WisDOT Specifications.

Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

All exposed non-colored concrete surfaces shall be protected during curing with a white pigmented curing compound. All colored concrete surfaces shall be protected during curing with clear curing compound.

Concrete to be removed and replaced shall be sawcut at the nearest existing joints. If directed by the Engineer, two (2) #4 epoxy coated tie bars, 12 inches in length, shall extend six (6) inches into the existing and the new concrete at the joints.

No concrete work may take place while it is raining. All concrete poured during rain events shall be removed and replaced at Contractor's expense.

Use of Contractor name stamp to mark concrete for permanent identification is prohibited.

4.3.02 CURB AND GUTTER

Minimum base course depth beneath curb and gutter shall be six (6) inches.

The top of the curb shall be marked where the sanitary sewer and water service cross the curb and gutter. The mark may be made by stamping. The depth shall be a minimum of one-sixteenth (1/16") inch deep. A "W" shall be stamped over each water services crossing and an "S" shall be stamped over each sanitary service crossing.

Beginning three (3) feet on both sides of inlets, curb and gutter shall be poured manually with an eight (8) inch flow line depression from the top of curb along the inlet tapered from the typical six (6) inch flow line. Concrete shall be poured behind the inlet casting so as to cover the bolt holes. Place one (1) seven (7) foot long epoxy coated #4 reinforcing rod in concrete gutter in front of inlet as directed by Engineer.

After curb and gutter is poured, backfill material shall be placed behind curb prior to placement of additional base course.

4.3.03 SIDEWALK

Topsoil shall be stripped prior to placement of the base material for the sidewalk.

Base for concrete sidewalk shall consist of a minimum of four (4) inches of ¾-inch dense graded crushed stone or gravel as specified in SECTION 5 - PAVEMENTS AND BASE COURSE.

EpoFoam joint filler shall be placed around all street light bases, valve boxes, hydrants and manholes located within concrete sidewalk surfaces. Seal the top ¼" with manufacturer specified NP-1 Sonoelastic caulk.

Generally, concrete thickness for public sidewalks shall be five (5) inches. Concrete thickness for public handicap ramps shall be six (6) inches and the concrete thickness at driveway openings shall be seven (7) inches.

Forms shall be equal to or greater than the sidewalk thickness. The Engineer may make exceptions to this at a radius. Metal forms shall be used as often as practical.

4.3.04 CYCLE TRACK

Cycle tracks shall be installed per sidewalk requirements except as herein modified. Cycle tracks shall be four (4) feet in width, unless noted otherwise on plans. Cycle track joints shall be 1/8 inch in width and, where applicable, line up with adjacent curb joints.

4.3.05 DETECTABLE WARNING FIELDS

Detectable warning fields are required where a sidewalk or bike path crosses vehicular way (excluding driveways), where a rail system crosses pedestrian facilities that are not shared with vehicular ways, at reflecting pools within the public right-of-way, which do not have curb or rim protruding above the walking surface, at islands and medians that are cut through level with the roadway, and at any other location required by Engineer.

Detectable warning fields for sidewalk and bike path ramps shall extend 24 inches in the direction of the pedestrian travel and shall extend the full length of the curb ramp or flush surface, a minimum of four (4) feet for sidewalk ramps and a minimum of eight (8) feet for bike path ramps.

4.3.06 DRIVEWAYS

All commercial driveways located along a curb and gutter roadway shall conform to these specifications unless specifically permitted otherwise by the Department.

Concrete thickness for driveway aprons shall be seven (7) inches and the crushed aggregate base thickness shall be four (4) inches.

For residential and commercial driveway openings along streets with existing curb and gutter, the contractor shall either remove and replace existing curb and gutter at the driveway opening per specifications or make a 'profile curb cut' in which the curb head is cut with a concrete saw specifically designed for this type of work.

4.3.07 PROTECTION OF CONCRETE

A. General. Contractor shall erect and maintain suitable barricades to protect the new concrete. Where it is necessary to provide for pedestrian traffic, the Contractor shall, at his own cost, construct adequate crossings as shown on the drawings or as specified. Crossing construction shall be such that no load is transmitted to the new concrete.

Any part of the work damaged or vandalized prior to final acceptance shall be repaired or replaced at the expense of the Contractor.

If curing compound is not applied, concrete must be cured with plastic until strength of 3000 psi is achieved or for seven (7) days, whichever comes first. Removal of plastic, whether temporary or permanent, during this time, is prohibited.

Construction activities and vehicular traffic shall not be permitted adjacent to or over newly placed concrete until a minimum compressive strength of 3000 psi has been achieved.

B. Cold Weather Protection. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306, WisDOT, and as herein specified.

Contractor shall be responsible for the protection of the concrete placed, and any concrete damaged by freezing or frost action during the first seven (7) days following its placement shall be removed and replaced by the Contractor at Contractor's expense.

Calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators shall not be used, unless otherwise accepted in mix designs.

C. Hot Weather Protection. When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305.

4.4 FIELD QUALITY CONTROL AND TESTING

4.4.01 TESTING

Owner will be responsible for concrete testing. Contractor shall coordinate testing with the Owner.

Materials and installed work may require testing and retesting at any time during progress of work. Tests, including retesting of rejected materials and installed work, shall be done at Contractor's expense.

END

SECTION 5 - PAVEMENTS AND BASE COURSE

5.1 GENERAL

5.1.01 RELATED DOCUMENTS

5.1.02 DESCRIPTION OF WORK

This section includes requirements for the provision and placement of base course, asphaltic concrete pavement, and pavement markings.

5.1.03 SCHEDULE

Unless specified differently, all surface paving shall be complete by September 15 and all binder paving shall be completed by October 31. Only patching will be allowed after these date as approved by Engineer.

5.1.04 SUBMITTALS

Prior to the commencement of paving, mix designs and aggregate sieve analysis shall be submitted to Engineer for approval.

5.2 MATERIALS

5.2.01 CRUSHED AGGREGATE BASE COURSE

The aggregates shall consist of hard, durable particles of crushed stone resulting from the artificial crushing of rock, boulders, large cobble stones, or concrete substantially all faces of which have resulted from the crushing operation. The material shall be free from dirt, debris, frozen materials, vegetable matter, shale and lumps or balls of clay.

The determination of the acceptability of the aggregates will be made by visual observation and/or laboratory test. The Engineer reserves the right to prohibit the use of material from any source, plant, pit, quarry or deposit where the character of the material or method of operation is not furnishing aggregate that conforms to the requirements of these Specification, unless satisfactory evidence is shown that material conforming to the specification requirements is produced.

NOTE: The City shall be notified 24 hours prior to the placement of base course. In giving this notice, the contractor shall indicate the source for the base course. If during rocking operations the source changes, the City must be notified. The contractor takes on the financial responsibility of placement of the base course from the new source if the material is unsuitable.

Unless specified differently, base course thickness shall be 12-inches consisting of 3-inch dense in the bottom 7-8 inches and 1 ¼-inch dense in the top 4–5 inches.

5.2.02 UNSCREENED BREAKER RUN STONE

The materials shall conform to the requirements of Section 311 Unscreened Breaker Run Stone of the WisDOT Specifications or as directed by the Engineer.

5.2.03 SELECT CRUSHED MATERIAL

The materials shall conform to the requirements of Section 312 Select Crushed Material of the WisDOT Specifications or as directed by the Engineer.

5.2.04 FLOWABLE FILL

Flowable fill shall be excavatable, having strength greater than 200 psi but not exceeding 300 psi. The following flowable fill mix design is recommended.

FLOWABLE FILL MIX DESIGN		
Material	Unit	Quantity
Sand	lb.	3000
Water	Gal.	43
Fly Ash	lb.	200
Air Content	%	25 - 30
Cement	lb.	50

5.2.05 ASPHALTIC CONCRETE PAVEMENT

Aggregate gradation for binder course shall be 19.0 mm nominal size aggregate and surface course shall be 12.5 mm nominal size aggregate.

Asphalt mix design shall be E-1, PG58-28, for roads and E-0.3, PG58-28 for shared-use paths, unless otherwise specified in the Special Provisions.

The contractor shall provide to the City the results from the Freeze/ThawTest (AASHTO T103) for the aggregate used in the work. The maximum percent loss for aggregates used in the work shall be four percent (4%).

5.2.06 ADJUSTING RINGS

Non-rocking Neenah cast iron adjusting rings or approved equal. Neenah Reference No. 1550-7151 for 1-1/2" adjusting rings and No. 1550-7201 for 2" adjusting rings.

5.2.07 TACK COAT

Type MS-2, SS-1, SS-1h, CSS-1, or an approved modified emulsified asphalt.

5.2.08 PAVEMENT MARKINGS

Epoxy paint.

5.3 EXECUTION

5.3.01 BASE COURSE

Prior to placement of the base course, the subbase shall be test rolled within the presence of the Engineer. All undercut areas shall be filled with select crushed material. Tapered edges shall be provided for all undercut areas as directed by Engineer.

Base course grade shall be set to allow thickness of asphaltic pavement such that new asphalt is ¼" above curb and gutter.

Depth of base course shall match existing, 12 inches minimum.

Each layer of base course shall be wetted and rolled to provide maximum compaction in accordance with Section 301 of the Standard Specifications.

The finished base course shall be fine graded in preparation for paving.

After final grading, Contractor shall maintain the base course until asphaltic paving work has been completed. All gravel surfaces damaged during construction shall be replaced.

5.3.02 FLOWABLE FILL

Flowable fill is required in all excavations within existing streets including under the curb and gutter, sidewalks and pavements.

5.3.03 FINISHING ROADWAY

The finished base course shall be fine graded in preparation for asphaltic concrete paving. Base course ramps at all existing pavement shall be removed to provide a full depth butt joint.

Asphaltic ramps around manholes and curb and gutter on existing binder course, to receive surface course, shall be removed.

5.3.04 NEW ROADWAYS

Newly constructed roadways shall, unless otherwise directed by the Engineer, receive binder course only. Placement of the surface course(s) shall be postponed as deemed necessary by the Engineer so as to minimize damage caused by construction traffic.

Manhole castings and valve boxes in roadways temporarily receiving binder course only, shall be set to binder grade. Manhole castings and valve boxes shall be set ¼" below final grade in all other areas unless otherwise directed by Engineer. "Scab" and monolithic ramping is prohibited.

Immediately prior to placement of surface course(s), Contractor shall install non-rocking cast iron adjusting rings on all manholes located within the area to be paved and raise all valve boxes to ¼" below final grade.

5.3.05 ASPHALTIC PAVING

Prior to commencement of paving operations, Contractor shall examine the finished road bed. Contractor shall notify Engineer of any areas of suspected instability. The pavement structure for new roads shall be determined from the standard cross-sections encountered in the field.

New finished asphaltic surface shall be ¼" above flag of adjacent curb and gutter.

All manhole castings and valve boxes within the paving limits of the street shall be adjusted to a ¼"below the finished asphaltic surface. Failure to meet this tolerance may require removal and replacement of the pavement, to limits determined by Engineer, at Contractor's expense.

Base course around manhole castings and valve boxes shall be hand trimmed and compacted with a vibratory plate compactor.

The Fitchburg Utility Department shall inspect their valve boxes and manholes prior to paving. Contractor shall provide two (2) days notice prior to paving to coordinate the inspection of the water valves. For City of Fitchburg Utility, call (608)270-4270.

Contractor shall furnish Class 1 barricades with flashers on all adjusted castings until paving has been completed. Tops of castings and valve boxes shall be oiled, or protected by other methods to prevent sealing of lids and filling of lift holes during paving. Upon completion of paving operations, Contractor shall check all castings and valve boxes to insure that the lids are clean and operational.

The thickness of binder and/or surface course mixture shall be installed in one (1) course each. The mixture shall be laid and compacted so that the average yields in pounds per square yard conform to the following chart:

SURFACE & BINDER YIELD - # / S.Y.

Thickness	Min.	Max.
1"	112	118
1 ½"	168	178
1 3/4"	196	206
2"	224	236
2 1/4"	252	266
2 ½"	280	295
3”	336	354

Whenever the yields fall below the minimum allowable yields specified above, the Engineer shall determine the corrective action to be taken. The corrective action may include removal and replacement of the area of deficient thickness, an overlay with approved material of the area of deficient thickness, or such other action as the Engineer shall determine. The area of deficient thickness shall be determined on the basis of street area, or area covered in one (1) day’s operation, whichever is less. The Engineer’s determination will be based on the circumstances of the area involved, and will include a determination of the distribution of costs of the corrective work required.

When the average yield on a project exceeds the maximum allowable yield, all excess material shall be paid for at the rate of one-half (½), the contract unit price for the type of material involved. The average yield for this purpose shall be computed on a daily basis, or a street area, whichever covers the smallest area of paving.

Place asphalt concrete mixture on prepared surface, spread and strike-off. Place inaccessible and small areas by hand. Place each course to required grade, cross-section, and compacted thickness.

Place asphalt in strips not less than ten (10) feet wide, unless otherwise acceptable to Engineer. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete binder course for a section before placing surface course.

5.3.06 ROLLING

Begin rolling when mixture will bear roller weight without excessive displacement.

Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.

Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and asphalt has attained the maximum density.

5.3.07 JOINTS

Joints between old and new pavements or between successive day's work shall be constructed and treated as to ensure thorough and continuous bond between the old and new mixtures.

A. Transverse Joints. Transverse construction joints shall be constructed by cutting the material back for its full depth so as to expose the full depth of the course. Where a header is used, the cutting may be omitted provided the joint conforms to the specified thickness. These joints shall be treated with tack coat material applied with a hose and spray nozzle attachment to fully coat the joint surface.

B. Longitudinal Joint. The longitudinal joint shall be made by overlapping the screed on the previously laid material for a width of not more than two (2) inches, and depositing a sufficient amount of asphaltic mixture so that the finished joint will be smooth and tight.

Longitudinal joints in the Surface course shall at no time be placed immediately over similar joints in the Binder course beneath. A minimum distance of 12 inches shall be permitted between the location of the joints in the Binder course and the location of similar joints in the Surface course above. These joints shall be treated with tack coat material to fully coat the joint surface.

C. Modified Longitudinal Joints. For all reconstructed roadways and new roads greater than 1,000 feet in length and 40 feet in width (face to face of curb), shall have “modified longitudinal joints”, unless otherwise directed by the Engineer.

The Contractor shall construct tapered, overlapping and notched longitudinal joints (in lieu of the standard longitudinal joints) for binder and surface courses of asphaltic pavement construction. Adjacent lanes shall be paved (brought level) within 48 hours unless delayed by inclement weather or otherwise required by the Engineer.

The longitudinal joint first pass shall be constructed by providing a plus or minus one-half (+/- ½) inch vertical notch at the lane joint and tapering the edge of the asphaltic material course. The taper shall have a one-inch rise over a 12-inch run and extend beyond the normal lane width or as directed by the Engineer. The tapers for all courses shall directly overlap and slope in the same direction. The finished longitudinal joint line of the top course shall be at the pavement centerline, if the roadway is two lanes, or at lane lines if the roadway is more than two (2) lanes.

The tapered portion of the pavement shall be constructed with a uniform slope. Attention shall be given to compaction of the tapered portion of the joints in order to avoid raveling or sprawling problems in the future. Compaction of the taper portions shall be as near to final pavement density as practicable. A tack coat shall be applied to each course of asphaltic material and to the in-place first pass taper before the succeeding adjacent or upper layer is placed.

5.3.08 PRIME AND TACK COAT

If asphaltic surface course is applied to an existing street, or is not applied the same day as binder course, the existing street or binder course surface shall be tack coated prior to surface paving.

Prior to placement of tack coat the streets shall be thoroughly cleaned and broomed.

Tack coat shall be applied immediately prior to placement of asphaltic surface course. The rate of application shall be between 0.05 and 0.10 gallons per square yard.

5.3.09 PAVEMENT MARKINGS

Pavement markings shall be applied per manufacturer's recommendations and when the outside air temperature is 45^{o}F and rising. If higher temperatures are required by the manufacturer for the specified paint, the manufacturer's recommendations shall govern.

5.3.10 PAVEMENT PATCHES

Pavement indentations in surface and binder courses shall be heat repaired, verses removed and replaced, when directed by Engineer.

END

SECTION 6 - STORM SEWER

6.1 GENERAL

6.1.01 RELATED DOCUMENTS

City of Madison Standard Specifications for Public Works Construction, latest edition. The specifications and standard detail drawings are available at:
http://www.cityofmadison.com/business/PW/specs.cfm

ASTM C76-90 – Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe

AASHTO M-198 – Joints for circular Concrete Sewer and Culvert Pipe Using Flexible Water tight Gaskets

6.2 MATERIALS

6.2.01 BEDDING AND COVER

Bedding and cover material shall be washed stone, all of which passes a 1-1/2" sieve.

6.2.02 GRANULAR BACKFILL

Granular Backfill for storm sewer shall be as specified in Section 209 of the WisDOT Specifications.

6.2.03 STORM SEWER PIPE

Reinforced concrete pipe shall be the only storm sewer material approved for use within public rights of way without specific written permission from the Department.

Reinforced concrete pipe shall meet the Standard Specifications for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe of the American Society for Testing Materials, Serial Designation C76 for circular pipe, Serial Designation C507 for elliptical pipe. Provide Class III unless indicated otherwise in the Specifications or on the Drawings.

Joints for circular pipe shall be tongue and groove meeting requirements of ASTM C443.

6.2.04 APRON ENDWALLS

Reinforced concrete pipe apron endwalls shall be the only endwalls approved for use within public rights of way without specific written permission from the Department. Pipe Class shall match the adjacent pipe material unless otherwise approved by the Department.

6.2.05 PIPE GATES

Pipe gates for reinforced concrete pipe apron endwalls shall be provided in accordance with the *City of Madison Standard Specifications for Public Works Construction, latest edition*, for all pipes 15" in diameter and larger that are upstream or downstream of a closed system. The specifications and standard detail drawings are available at:
http://www.cityofmadison.com/business/PW/specs.cfm

6.2.06 STORM SEWER STRUCTURES

Storm sewer structures shall be precast reinforced concrete with cored, non-scored, smooth-formed openings. In lieu of cored openings, structures may also have formed openings and/or be poured in place.

2' x 3' inlets shall conform to WisDOT Type 2x3-FT inlets. Four (4), Five (5), and six (6) foot diameter manholes shall conform to WisDOT Type 4-FT Diameter, 5-FT Diameter, and 6-FT Diameter manholes, respectively.

Manholes shall be reinforced concrete conforming to the Standard Specifications for Precast Reinforced Concrete Manhole Sections of ASTM C478.

Adjusting rings shall be Ladtech© HDPE adjusting rings or approved equal. An approved butyl sealant shall be placed in the annular space between the rings, the rings and the structure, and the rings and the casting.

Inlets located at low points must include a Schedule 80 PVC weeper installed at the subgrade below the adjusting rings. The weeper shall be wrapped with Mirafi 600X, or approved equal, geotextile fabric to prevent soil intrusion.

6.2.07 CASTINGS

Castings for various structure types shall be provided as follows. Contractor shall correctly orient the inlet grates relative to the direction of flow as directed by the Engineer. Inlet curb box heads shall read "DUMP NO WASTE DRAINS TO LAKE" per S.D.D 6.02.

Structure Type	WisDOT Cover Type	Neenah Casting Designator
Type 2x3-FT Inlet (Continuous Grade)	Type H	R-3067-7004-L (vane grate)
Type 2x3-FT Inlet (Low Point, single)	Type H-S	R-3067-7004-R (diagonal grate)
Type 2x3-FT Inlet (Low Point, twin)	Type H	R-3067-7004-L (vane grate)
Type 2x3-FT Inlet (Driveway)	none	R-3290-A
Manhole	Type "J" Special	R-1550 (self seal, non-rock)

Non-rocking cast iron adjusting rings shall be as specified in SECTION 5 – PAVEMENTS.

6.3 EXECUTION

6.3.01 GENERAL

Before the start of construction, the Contractor shall verify existing storm sewers elevations with proposed plan elevations. All significant differences between existing storm sewer inverts and plan inverts (greater than 0.1") shall be reported to the Engineer.

Storm sewer shall be installed to an elevation tolerance of plus or minus 0.1 feet of the plan elevation or elevation provided on the grade sheet at any point along the main.

When a sewer crosses under a water main, provide a minimum of six (6) inches separation between the bottom of the water main and the top of the sewer. When a sewer crosses

over a water main, provide a minimum of 18 inches separation between the top of the water main and the bottom of the storm sewer.

6.3.02 HANDLING OF MATERIALS

Handle materials with care to avoid damage. Do not dump or drop materials. Remove all damaged or flawed materials from the site.

Arrange for suitable sites for material storage.

6.3.03 LAYING OF PIPE

The trench shall be excavated to an elevation at least six (6) inches below the elevation established for the bottom of the pipe. This depth shall be backfilled with bedding material. Bedding and cover material shall be used for the full cross section of the excavated trench to the springline of the pipe being installed. Granular material shall be provided from the springline of the pipe to the proposed pavement subgrade.

Compaction of Granular Backfill material shall meet 95% Modified Proctor, the standard specification of ASTM D-1557, within three (3) vertical feet of the pavement subgrade. Compaction of Granular Backfill material shall meet 90% Modified Proctor, the standard specification of ASTM D-1557, in the cross-sectional area of the trench between the springline of the pipe and the plane three (3) vertical feet from the proposed pavement subgrade.
Not more than 200 feet of trench shall be opened at any one time. Not more than 100 feet of trench may be opened in advance of the completed pipe laying operations; and not more than one street crossing may be obstructed by the same trench at any one time.

Lay pipe uniformly to line and grade so that the finished sewer presents a uniform bore. Noticeable variations from true alignment and grade will be sufficient cause for rejection of the work.

Commence at the lowest point and proceed to the upper end. Lay pipe with bell-end pointing up-grade.

All storm sewer pipe must extend through the entire structure wall plus two inches beyond.

When work is stopped for any reason, securely plug the end of the pipe.

Pipe jointing: Assemble joints in accordance with the pipe manufacturer's instructions.

Concrete pipe pick holes shall be tar sealed with a formed concrete plug.

6.3.04 BEDDING AND COVER

Provide a minimum of six inches of bedding material under the pipe barrel and four inches under the bell. Spade or shovel-slice the material so that if fills and supports the haunch area and encases the pipe. If excavation is carried deeper than six inches below the pipe barrel, backfill the excess depth with bedding material.

After the pipe has been laid and jointed, place cover material by hand or equally careful means to the springline of the pipe. Compact cover material using tamping bars and/or mechanical tampers.

6.3.05 GRANULAR BACKFILL

Granular Backfill shall extend from the springline of the pipe to the proposed pavement subgrade. Compaction of Granular Backfill material shall meet 95% Modified Proctor, the standard specification of ASTM D-1557, within three (3) vertical feet of the pavement subgrade. Compaction of Granular Backfill material shall meet 90% Modified Proctor, the standard specification of ASTM D-1557, in the cross-sectional area of the trench between the springline of the pipe and the plane three (3) vertical feet from the proposed pavement subgrade.

6.3.06 APRON ENDWALLS

Joint ties shall be installed at the last (downstream) two (2) joints on any pipe run ending in an apron endwall constructed with reinforced concrete pipe or horizontal elliptical reinforced concrete pipe of any size.

Riprap, underlined with geotextile fabric, shall be provided at the ends of the apron endwall as indicated on the plans or as directed by the Engineer. Placement shall be in accordance with Section 606 of the WisDOT Specifications. Geotextile fabric shall extend a minimum of two (2) feet under the apron endwall.

Pick holes shall be sealed with concrete on the inside and the outside of the structure prior to backfilling.

6.3.07 PIPE GATES

Pipe gates for reinforced concrete apron endwalls shall be installed in accordance with the *City of Madison Standard Specifications for Public Works Construction, latest edition*.

6.3.08 STORM SEWER STRUCTURES

Storm sewer structures shall have a minimum of three (3) inches and a maximum of nine (9) inches of adjusting rings. An approved butyl sealant shall be placed in the annular space between the rings, the rings and the structure, and the rings and the casting. All adjustment for matching road grade shall be made utilizing a molded and indexed slope ring. Adjusting rings shall be installed per manufacturer's specifications.

Storm sewer manhole rims may need adjustment from the plan elevation to meet field conditions. The cost of this work shall be incidental to the contract.

Poured concrete collars shall be vibrated and trowel finished. Collar shall be eight inch by eight inch (8"x8") on the exterior and extend around the entire pipe on both sides. The inside and outside of the collars shall be completed at the same time. Concrete collars shall cure for 24 hours and be inspected and approved by the Engineer prior to backfilling.
All storm sewer structures shall have a field poured bench with a positive flow channel.

All inlets located at, or immediately adjacent to, low points in the roadway profile, shall be constructed with a two (2) inch diameter plastic weep pipe located at the bottom of the subgrade. The outside end of the pipe shall be covered with filter fabric.

Pick holes shall be sealed with concrete on the inside and the outside of the structure prior to backfilling.

6.3.09 CASTINGS

Inlet castings shall be set to final grade with adjusting rings per SECTION 6.3.08 – STORM SEWER STRUCTURES prior to and separate from pouring the curb and gutter. Inlet castings shall be set with an eight (8) inch flow line depression from the top of curb. Concrete shall be poured behind the inlet casting so as to cover the bolt holes.

Manhole castings in roadways temporarily receiving binder course only, shall be set to binder grade. Manhole castings shall be set ¼" below final grade in all other areas unless otherwise directed by Engineer. "Scab" and monolithic ramping is prohibited.

Manhole castings set to binder grade, shall be brought to ¼" below surface grade immediately prior to placement of surface coarse, with non-rocking cast iron adjustment rings.

6.3.10 EXISTING STORM SEWER CONNECTIONS

All storm sewer connections to existing structures shall be made by using a sawcut connection with a poured concrete collar. The inside and outside of the poured concrete collar shall be completed at the same time. Concrete collar shall be vibrated and trowel finished. Poured concrete collars shall cure for 24 hours and be inspected and approved by the Engineer prior to backfilling. For connections, the Contractor shall have the option of using an approved watertight adaptor for the joint.

A poured concrete collar may be required at the junction of a new RCP pipe to an existing RCP pipe when identified on the plans or directed by Engineer. The junction shall be clean cut with no gap. Concrete collar shall have a minimum width extending one (1) foot in either direction of the joint and a minimum thickness around the pipe of eight (8) inches. Concrete collar shall be vibrated and trowel finished. Poured concrete collars shall cure for 24 hours and be inspected and approved by the Engineer prior to backfilling.

6.3.11 ABANDONMENT

A. Structures. The casting, all adjusting rings, and the top three (3) feet of the structure shall be removed. Castings are the property of the City. A hole shall be cut into the bottom of the structure to accommodate drainage through the structure. All openings within the structure shall be plugged with concrete. The entire structure shall be completely filled in with granular material or cellular concrete. All disturbed areas shall be backfilled with the required backfill material.

B. Pipe. The apron endwall shall be removed. The pipe end shall be plugged with concrete.

6.3.12 DEWATERING

If conditions warrant, Contractor shall furnish and install well point systems or deep wells. Spacing and depth of well points or deep wells shall be adequate to lower the ground water table below the trench bottom. No extra payment will be made for dewatering of the trench whether accomplished by the use of sumps and pumps, well point systems or deep wells.

Contractor shall take all necessary precautions during the dewatering operation to protect adjacent structures against subsidence, flooding or other damage.

In areas where continuous operation of dewatering pumps is necessary, Contractor shall avoid noise disturbance to nearby residences to the greatest extent possible by using electric driven pumps, intake and exhaust silencers or housing to minimize noise.

Upon completion of the dewatering project all dewatering wells shall be permanently abandoned. If dewatering wells are less than 25 feet deep they shall be permanently abandoned by removing the well casing and screens and filling the borehole with bentonite. If dewatering wells are 25 feet deep or greater they shall be abandoned per NR 812.26.

6.3.13 FROST CLEARANCES

Storm sewers or culverts which cross an active sewer or water main or lateral shall have a minimum clear vertical clearance of three (3) feet. Crossings with lesser vertical clearance shall be protected from frost damage by placement of two sheets of two-inch thick polystyrene board insulation (four inches total) as directed by the Engineer.

6.4 FIELD QUALITY CONTROL AND TESTING

6.4.01 TELEVISING

All storm sewers shall be televised.

Closed circuit television shall be utilized for inspecting the interior of all completed sections of the mains. Televising shall take place after all utilities are installed, backfilled and compacted, all storm sewer has been cleaned, all road undercuts are complete, and prior to placement of pavement. Audio-visual Digital Video Display (DVD) recordings of these inspections and written and pdf logs of same shall be submitted to the Engineer prior to the Contractor's request for a final inspection of the project. The DVD recordings and written and pdf logs submitted to the Engineer shall exclusively be for storm sewer, DVD recordings and written and pdf logs for sanitary sewer shall be submitted separately. Inspection records shall be of suitable format, and shall include, but not necessarily be limited to, the following data:

Project Title, Owner Name
Date of Inspection, Type of Pipe and Size
Weather
Names of Inspectors and Technicians
Location of Line
Manhole Numbers, Section Length
Direction of Inspection and Measurements
Location, size, and direction of all laterals, including laterals extending from manholes
General Condition of Line
Deflections (vertical and horizontal)
Joint Conditions
Points of Infiltration, Locations of Obstructions

The television camera used shall be specifically designed and constructed for sewer inspection and shall take picture in color. Black and white shall not be accepted. Lighting for the camera shall be operative in 100 percent humidity conditions. The camera shall have a minimum of 600 lines of resolution. Picture quality and definition shall be to the complete satisfaction of the Owner. The improvements shall not be eligible for acceptance prior to Contractor's submission of televising records which are deemed satisfactory by the Owner.

The Contractor shall, prior to televising, deposit into the new sewer mains and services a minimum amount of water as directed by the Engineer to allow for indication of sags in the pipe.

DVD records shall be made of all sections of the new sewer main. The video shall be made continuously as the camera is pulled or driven through the line and shall include a panorama view of each manhole. Each recording shall be in DVD format and shall be numbered and dated. A list shall be provided on the container for each DVD indicating the DVD number, project name and sections of sewer included. All recordings shall be made on new DVDs and the DVDs shall become the property of the Owner. The Contractor shall be responsible for supplying all safety equipment necessary to complete the work in compliance with applicable OSHA and DCOM standards.

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SECTION 7 - WATER MAINS, HYDRANTS, AND SERVICE LATERALS

7.1 GENERAL

7.1.01 RELATED DOCUMENTS

7.1.02 DESCRIPTION OF WORK

This section includes requirements for the provision and installation of water mains, fire hydrants, water services, and related fittings.

7.2 MATERIALS

7.2.01 PIPE BEDDING AND COVER

Bedding and cover material for water main, valves, hydrants, hydrant leads, water services, and related fittings, shall be approved bedding sand with 100% of material passing a 3/8" sieve. *No native material from trench shall be used for bedding or cover material.* Unwashed bank run sand and crushed bank run gravel will be considered generally acceptable cover material.

7.2.02 GRANULAR BACKFILL

Granular backfill material shall be granular and shall consist of durable particles ranging in size from fine to coarse in a substantially uniform combination. Sufficient fine material shall be present to fill all the voids in the coarse material. No stones over three (3) inches or clay lumps shall be present.

7.2.03 BACKFILL MATERIAL

When the type of backfill material is not specified, excavated backfill material may be used provided that such material consists of loam clay, sand, gravel, or other materials which, in the opinion of the Engineer, are suitable for backfilling. All backfill materials shall be free from cinders, ashes, refuse, vegetable or organic matter, boulders, rocks or stone, frozen lumps or other such deleterious, unsuitable material.

7.2.04 WATER MAIN AND FITTINGS

All water main pipe, fittings and specials shall be ductile iron conforming to AWWA C151 and shall be manufactured in the United State of America and labeled as such. Use of foreign materials is prohibited. Thickness class and joint style shall be as specified below for type of installation. Use of polyvinyl chloride water pipe or other composite materials is not allowed.

All buried water main pipe shall be push-on or mechanical joint and minimum special thickness Class 52 with a minimum rated working pressure of 350 psi. Pipe wall thickness shall also meet the requirements of AWWA C150 for buried piping with depth and cover as shown in Figure 1 for *laying condition Type 5 with the addition of one foot of cover over top of pipe*. The words "Ductile Iron" along with the weight and thickness class of pipe shall be plainly marked on the exterior of each water main pipe.

Mechanical joints or push-on joints shall utilize vulcanized synthetic rubber gaskets and shall conform to AWWA C111. Bolts on the exterior joints shall be high-strength low-allow steel (Corten or equal) conforming to AWWA C111. Certificate to the effect shall be provided.

All pipe, valves, and fittings, on the water mains shall be furnished with cable bond conductor or electrobond conductivity strips. Thermite welded straps are allowed provided weld points are thoroughly coated with bitumastic material. Lead tipped gaskets, conductive gaskets, or bronze wedges, will not be allowed. Armor tipped gaskets are allowed at mechanical joint fittings.

Inner surfaces of all ductile iron piping and fittings shall be cement mortar lined and asphaltic coated. All buried water main piping shall be asphaltic coated on the outside. Cement mortar lining and asphaltic coating shall be in accordance with AWWA C104.

Mega-lug glands shall be Ebaa Iron Inc. Series 1100, or approved equal.

All buried ductile iron water main piping and fittings shall be polyethylene encased in accordance with AWWA C105. Polyethylene encasement shall be a minimum 8mil thickness and installed in accordance with manufacturer's recommendations.

All exposed water main, interior piping, and piping in pits or manholes shall be flanged joint and minimum special thickness Class 53 with a minimum rated working pressure of 350 psi. Pipe wall thickness shall also meet the requirements of AWWA C115 for flanged joint.

Exposed interior piping shall be furnished with outside surfaces prepared in accordance with near white grade SSPC Specifications No. 10 removing all dirt, rust scale, and foreign materials. Cleaned surfaces shall be shop primed. Shop priming shall be with one coat of Tnemec 69-1255 Hi-Build Epoxoline primer, or equal, applied to a minimum of 5.0mils dry thickness. Primer used shall be compatible with proposed finish coats; Contractor to verify. It is the intent of these special provisions that all piping, supports, and appurtenances shall be furnished shop primed, clean, and ready to accept finish painting by Contractor, with a minimal amount of surface preparation.

In cases where corporation stops are to be tapped into mains, pipe wall thickness shall be furnished as specified in AWWA C151 to provide four threads. Pipe saddles may be furnished in lieu of pipe thickness as approved by Utility.

All water main fittings shall be ductile iron conforming to AWWA C153 or AWWA C110.

Water main plugs; in the absence of a flushing hydrant, Contractor shall furnish and install MG caps with a ¾" corporation stop in all plugged dead ends. Care shall be taken in placing concrete for thrust blocks to protect the corporation and retain operability. All ends shall be marked with a 10-foot, 4"x4" placed at the invert and painted blue.

Tapping sleeves shall be Smith Blair 622, epoxy coated carbon steel sleeve with MJ mechanical joint outlet and stainless steel bolts, or approved equal.

7.2.05 VALVES AND VALVE BOXES

Resilient Wedge Gate Valves: All valves 16" or smaller shall be resilient seat gate valves meeting the requirements of AWWA C509. Gate valves shall have ductile iron body, resilient wedge, non-rising stem and O-ring packing box, and rated for 250 psi working pressure. All water main gate valves shall have mechanical joint ends unless otherwise specified. Valves shall be American Flow Control resilient wedge gate valves or approved

equal. Operators on water main valves shall be 2-inch square nut. Stainless steel bolts shall be used for connection of valve to water main pipe.

Buried valves shall be epoxy coated in accordance with AWWA C550.

Valve box stabilizer shall be Adaptor, Inc., or approved equal. Determination of specific model shall be as recommended by the manufacturer.

Valve boxes shall be Tyler Model No. 6860DD, or equal, with No. 6 base, three (3) piece screw type bow, 5-1/4 inch shaft and stay-put cover marked "WATER". Valve boxes shall be manufactured in the United States of America and labeled as such. Use of foreign materials is prohibited.

Rubber Seated Butterfly Valves: All valves 20" or larger shall be rubber seated butterfly valves meeting the requirements of AWWA C504. Joint style shall be as specified for piping installation. Butterfly valves shall be open left, Mueller B3211-20 or approved equal.

7.2.06 FIRE HYDRANTS

All fire hydrants, private and public, shall conform to AWWA C502 with 5-1/4 inch main valve opening, 6-inch mechanical joint inlet, two 2-1/2 inch National Standard hose connections, one 4-1/2 inch National Standard pumper connection, 1-1/2 inch pentagon operating nut and caps, open left. Hydrant shall have bronze seat ring and seat insert, and ductile iron stand pipe, nozzle section, bottom and cross arm. Hydrant shall be Waterous WB-67, seven (7) foot bury, with breakaway flange and painted red. All areas of hydrant with paint defects shall be repainted with Cote-All AZ 5402 or approved equal. Stainless steel bolts shall be used for connection of hydrant to water main pipe.

Fire hydrant markers shall be 36-inch, orange, *Slimline FH* fire hydrant marker manufactured by Flexstake, Inc., Model No. SFH3O.

Fire hydrant leads shall be Class 52 ductile iron and all joints in the lead shall be mechanical joints with Meg-A-Lug glands, rodding, or an approved locking joint conforming to the requirements in 7.2.04 WATER MAIN AND FITTINGS. All public fire hydrant leads shall be six (6) inch in diameter unless otherwise specified. All private mains between a municipal main and a private fire hydrant shall be eight (8) inch in diameter.

Fire hydrant auxiliary valves shall be gate valves conforming to the requirements in 7.2.05 VALVES AND VALVE BOXES.

7.2.07 WATER SERVICES

Materials for water services four (4) inches and larger shall be as specified above in 7.2.04 WATER MAIN AND FITTINGS and in 7.2.05 VALVES AND VALVE BOXES.

Water service piping for services smaller than four (4) inches shall be Type K soft copper conforming ASTM B88. Use of PVC water service piping or other composite materials is not allowed. Corporations, curb stop valves, and curb boxes shall be as follows:

A. 3/4-inch and 1-inch services. Corporations shall be Mueller H-15008, compression fitting connection. Curb stop valves shall be Mueller II Oriseal H-1504-2, compression fitting connection.

B. 1-1/2-inch and 2-inch services. Saddles shall be a Mueller double-strap bronze service saddles or approved equal. Corporations shall be Mueller H-15013,

compression fitting connection. Curb stop valves shall be Mueller II Oriseal H-15209, compression fitting connection.

C. Curb Boxes. Curb boxes shall be Mueller H-10385 or H-10386, as applicable, arch style, complete with lid and 4-foot stationary rod, Mueller 84154. Lids shall be marked "WATER" and set to final grade.

Mueller H-15403 three piece compression union shall be used for splicing copper. Splicing will only be allowed if service run is longer than available lengths of service material.

7.2.08 ABANDONMENT

Water Mains ends to be abandoned and to be left in service shall be sealed with a mechanical joint plugs and caps. Mechanical joint plugs and caps shall be ductile iron conforming to AWWA C153 or AWWA C110.

Bronze plugs shall be installed with Mueller 110 Compression Fittings (Model No. H-15451) at the ends of all copper water services to be abandoned.

7.3 EXECUTION

7.3.01 GENERAL

Before the start of construction, the Contractor shall verify existing water main location and elevations with proposed plans. All significant differences between existing water main locations (greater then one-foot) and elevations (greater than six-inches) shall be reported to the Engineer.

Water main shall be installed to an elevation tolerance of plus or minus 0.1 feet of the plan elevation or elevation provided on the grade sheet at any point along the main.

When a sewer crosses under a water main, provide a minimum of six (6) inches of separation between the bottom of the water main and the top of the sewer. When a sewer crosses over a water main, provide a minimum of 18 inches separation between the top of the water main and the bottom of the sewer.

7.3.02 HANDLING OF MATERIALS

Handle materials with care to avoid damage. Do not dump or drop materials. Remove all damaged or flawed materials from the site.

7.3.03 TRENCH

The width of trench below the outside top of the pipe shall be as shown in the following table for the sizes listed. A minimum clearance of eight inches between the outside of the pipe barrel and the trench wall at the pipe spring line shall be maintained. If sheeting is used, the trench width shall be measured as the clear distance between inside faces of the sheeting.

MAXIMUM WIDTH OF TRENCH BELOW TOP OF PIPE

Internal Pipe Diameter (inches)	Trench Width (inches)
4 -6	30
8 – 12	36
16	39
20 or larger	42

Not more than 200 feet of trench shall be opened at any one time. Not more than 100 feet of trench may be opened in advance of the completed pipe laying operations; and not more than one street crossing may be obstructed by the same trench at any one time.

7.3.04 BEDDING AND COVER

Bedding and cover material shall be provided for all water main, valves, hydrants, hydrant leads, water services, and related fittings.

Bedding shall be a minimum of four (4) inches thick. Bedding shall extend to the full width of the trench. Contractor shall perform all necessary excavation and shall furnish all required material to provide this bedding. If excavation is carried deeper than the required bedding thickness, the excess depth shall be backfilled with bedding material. Bedding material shall be compacted using tamping bars and/or mechanical tampers.

All trenches shall be backfilled by hand to one foot above the top of the pipe with approved cover material. Cover material shall be deposited in the trench for its full width on each side of the pipe, fittings and appurtenances simultaneously in six-inch (6”) layers and shall be compacted using hand tamping bars and/or mechanical tampers.

7.3.05 GRANULAR BACKFILL

Granular backfill shall extend from one-foot above the pipe to the proposed pavement or hard surface subgrade and within the surfaces zone of influence. Compaction of granular backfill material shall meet 95% Modified Proctor, the standard specification of ASTM D-1557, within three (3) feet of the pavement or hard surface subgrade. Compaction of granular backfill material shall meet 90% Modified Proctor, the standard specification of ASTM D-1557, in the cross-sectional are of the trench between one-foot above the pipe and the plane three (3) vertical feet from the proposed pavement or hard surface subgrade.

7.3.06 BACKFILL

When the type of backfill material is not otherwise specified, excavated material may be used for backfill material as long as it meets the requirements of 7.2.03 BACKFILL MATERIAL. Compaction of backfill material shall meet 90 % Modified Proctor, the standard specification of ASTM D-1557.

7.3.07 WATER MAIN AND FITTINGS

All pipe and fittings shall be installed to a minimum depth of cover of 6.5 feet. Installations which cannot meet this requirement will require insulation as required and approved by Utility.

All ductile iron pipe and fittings shall be encased in polyethylene in accordance with manufacturer’s instructions. Any rips or punctures shall be repaired prior to backfilling.

Thrust restraint shall be designed and provided in accordance with AWWA M41, Manual of Water Supply Practices. Concrete thrust blocking is also required for hydrants, tees, and bends. Thrust blocking for mains 12-inches and larger as well as areas with high pressure and/or flows shall be poured in place. Concrete thrust blocks shall be placed to permit full access to pipe and accessories.

Meg-a-Lug glands or steel rodding shall be used at all horizontal and vertical bends, hydrant leads, and any joint 10 feet or less from a horizontal or vertical bend.

When work is stopped for any reason, securely plug the end of the pipe with a watertight plug or cap.

7.3.08 VALVES AND VALVE BOXES

Valves shall be set on solid bearing. Jump valves with bonding straps to adjacent pipes as necessary to provide full continuity across valve. Install valve box stabilizers on all gate valves four (4) inches and larger. Set valve box on valve box stabilizer plumb over valve. Valve boxes shall be set to binder grade unless otherwise directed by Engineer.

An operator nut extension shall be installed by the Contractor when the vertical distance between the top of the nut to the finished pavement surface exceeds seven (7) feet. Operator nut extensions shall be supplied by the Fitchburg Utility district at no cost to the Contractor.

7.3.09 FIRE HYDRANTS

The fire hydrant shall be connected to the auxiliary valve with a two foot length of pipe. All joints on the fire hydrant leads, including valve joints, shall be made using Meg-A-Lug glands, rodding, or an approved locking joint. Reaction backing shall be provided for all hydrants. About one-half cubic yard of 1-1/2" clear (washed) stone shall be placed from the bottom of the trench around the hydrant elbow and up the hydrant barrel. The clear stone shall be covered with 8mil plastic to prevent the mixing of fines from the backfill.

Contractor shall furnish all necessary fittings in the fire hydrant lead in order to install the fire hydrant in a plumb condition at locations shown on the drawings and at the specified depth of bury. The pumper nozzle of all fire hydrants shall be installed with the nozzle pointing toward the street with center at 24" above the ground. Fire hydrant auxiliary valves shall be installed behind the curb, unless otherwise directed by Engineer. Engineer reserves the right to alter the location of fire hydrants from that shown on the drawings.

Hydrants and hydrant auxiliary valves shall be jumped with bonding straps to adjacent pipes as necessary to provide full continuity across hydrant and valve.

7.3.10 WATER SERVICES

All services shall be installed to a minimum depth of cover of 6.5 feet. Installations which cannot meet this requirement will require insulation as required and approved by Utility.

Laterals shall be extended 10 feet beyond the right-of-way or easement line, whichever is further from the roadway centerline.

Water services less than four (4) inches in diameter shall include a corporation stop, service tubing, curb stop, curb box, couplings, and all other appurtenances necessary for complete installation. All corporations shall be wet tapped. Curb boxes shall be placed on 8" x 12" x 2" thick solid concrete blocks lying on undisturbed earth.

Water services four (4) inches and larger shall be installed per section 7.3.07 WATER MAIN AND FITTINGS. Water service valves for services four (4) inches and larger shall be installed per 7.3.08 VALVES AND VALVE BOXES with the exception that valve box shall be set to final grade if not located within the pavement.

Water service curb boxes and valve boxes shall be marked with a 2"x4" wood post, placed vertically two feet under the surface and extending two feet (2') above ground. All curb box/valve box markers shall be painted blue.

All water service stubs shall be marked with a 4" x 4" wood post, placed vertically at their invert and extending two feet (2') above ground. All water service markers shall be painted blue.

Water services two (2) inches or less in diameter shall be installed more than 24 inches from a sewer (clear distance) and/or a minimum of 12 inches above sewer (clear distance). Water services larger than two (2) inches in diameter shall be installed a minimum of eight (8) feet from a sewer (center of pipe to center of pipe).

7.3.11 ABANDONMENT

Water mains and water service laterals shall be abandoned in accordance with WUCA Specifications accept as herein modified.

When abandoning existing water main, mechanical joint plugs shall be installed into existing fittings and mechanical joint caps shall be installed over existing pipe ends of water main to be abandoned and water main that will remain in service. Plugs, caps, and all joints within ten (10) feet of the cap or plug of main to remain in service shall have meg-a-lug glands or steel rodding. The ends of existing pipe and any disturbed fittings to remain in service shall be thrust blocked. When valves are to be abandoned, the entire valve box shall be removed. All disturbed areas shall be backfilled with the required backfill material.

All water service laterals, to be abandoned, shall be abandoned at the corporation unless otherwise directed by Engineer. The copper pipe shall be cut two feet from the corporation and a bronze plug shall be installed with a Mueller 110 Compression Fitting (Model No. H-15451). The entire curb/valve box shall be removed and all disturbed areas shall be backfilled with the required backfill material.

7.4 FIELD QUALITY CONTROL AND TESTING

7.4.01 TESTING

A combined hydrostatic pressure and leakage test shall be performed on all pipe, fittings, services and joints in accordance with AWWA C600 after service laterals are installed. During performance of test, water main shall be pressurized to 150% of maximum operating pressure, 150 psi minimum. All air shall be removed from the mains prior to testing by flushing and, as necessary, by installing corporations at high points. Test shall meet requirements of AWWA C600 for a minimum of two consecutive hours. Prior to conducting the combined pressure and leakage test, Contractor shall backfill the trench for its full depth. All bends, services and special connections to the main shall be adequately blocked and tied prior to the test. Any damage caused to the water main, or its appurtenances during performance of these tests shall be corrected by Contractor at the Contractor's expense.

Contractor shall keep a record of all tests performed. These records shall show the individual lengths of main tested and test results.

Where connections are made to existing mains, it shall be the responsibility of Contractor to provide the necessary hydrostatic test on all new mains installed. This may require, but is not limited to, the installation of temporary valves to isolate the new system from the existing system. All materials, work and equipment necessary for this work shall be furnished by Contractor at the Contractor's expense.

Continuity Tests: Contractor shall furnish all equipment, labor and miscellaneous items necessary to perform electrical continuity test on all new water main installed. Tests shall be performed using an ohmmeter to assure that electrical continuity exists across all joints. Contractor shall make all necessary repairs to establish continuity across joints.

7.4.02 DISINFECTION AND STERILIZATION

Contractor shall disinfect and sterilize all new and old mains where it is necessary to cut into them. The disinfection shall be done in accordance with AWWA C601. All materials and equipment needed for disinfection of mains shall be furnished by Contractor. Heavily chlorinated water, used for the purpose of disinfecting the mains, shall not remain in the water mains for more than four (4) days. Contractor shall be responsible for flushing of mains. Contractor shall fill out a flushing permit 24 hours prior to any flushing. Flushing procedures shall be reviewed and approved by Utility prior to flushing. Heavy chlorinated water shall be flushed down sanitary sewer unless directed otherwise by Utility. Contractor shall be required to obtain all safe water samples for entire system being installed prior to hydrostatic and leakage test. Contractor shall obtain water sample bottles from the Utility and deliver them to the State Lab of Hygiene. All testing shall be under the direction of the Utility. The Contractor shall be responsible for any necessary water main repairs, permits for flushing, flushing and re-sampling until safe samples are received. The Utility will open the tested main to the system.

Water mains shall be flushed prior to installation of copper water services. Two sets of safe water samples shall be obtained; one set prior to installation of water services and a second set after installation of water services. Both sets of safe samples shall be obtained prior to hydrostatic and leakage test.

END

SECTION 8 - SANITARY SEWER MAINS AND LATERALS

8.1 GENERAL

8.1.01 RELATED DOCUMENTS

8.1.02 DESCRIPTION OF WORK

This section includes requirements for the provision and installation of sanitary sewer mains, structures, and laterals.

8.2 MATERIALS

8.2.01 PIPE BEDDING AND COVER

All pipe shall be bedded and covered in approved 3/4 inch clear (washed) stone. *No native material from trench shall be used for bedding material.*

8.2.02 GRANULAR BACKFILL

Granular backfill material shall be granular and shall consist of durable particles ranging in size from fine to coarse in a substantially uniform combination. Sufficient fine material shall be present to fill all the voids in the coarse material. No stones over three (3) inches or clay lumps shall be present.

8.2.03 BACKFILL MATERIAL

When the type of backfill material is not specified, excavated backfill material may be used provided that such material consists of loam clay, sand, gravel, or other materials which, in the opinion of the Engineer, are suitable for backfilling. All backfill materials shall be free from cinders, ashes, refuse, vegetable or organic matter, boulders, rocks or stone, frozen lumps or other such deleterious, unsuitable material.

8.2.04 SANITARY SEWER PIPE AND FITTINGS

A. Reinforced concrete sewer pipe and fittings. Reinforced concrete pipe shall meet requirements of ASTM C361-89, minimum Class IV.

Standard and special fittings shall conform to requirements of the trade and these specifications. All fittings shall be of a strength at least equal to that of the main sewer and shall be jointed with the same type of joint as used in the main sewer. Only precast fittings shall be used.

Provide Reinforced concrete pipe and fittings with gasketed joint in accordance with ASTM C443. All pipe shall be specifically built to fit the gasket used and shall be continuous O-ring of circular cross section.

Lift holes will not be permitted in sanitary sewers.

B. Composite sewer pipe and fittings. Composite sewer pipe and fittings shall meet the requirements of ASTM D2680. Joints shall be solvent welded and shall be made as recommended by the manufacturer. If laser beam alignment is used, adequate blower

capacity shall be provided in the main to remove solvent fumes, which distort the laser beam.

C. Polyvinyl chloride gravity sewer pipe and fittings. Polyvinyl (PVC) sewer pipe shall meet the requirements ASTM D3034 for Type PSM Polyvinyl Chloride Sewer Pipe and Fittings. All PVC sewer pipe shall have maximum standard dimension ratio (SDR) of 26.

Joints in PVC sewer pipe and fittings shall be elastomeric. Fittings shall be of standard manufacture; injection molded, and shall have a maximum standard dimension ratio (SDR) of 26.

PVC pipe and fittings furnished shall be the product of one manufacturer and the manufacturer shall have an experience record substantiating acceptable performance of the materials to be furnished.

D. Ductile Iron Sewer Pipe and fittings. Ductile iron pipe and fittings shall meet requirements of AWWA C151 and shall be manufactured in the United States of America and labeled as such. Use of foreign materials is prohibited. All buried sewer main pipe shall be push-on or mechanical joint conforming to AWWA C111, and minimum special thickness Class 52. Pipe wall thickness shall also meet the requirements of AWWA C150 for buried piping with depth and cover as shown on the drawings for laying condition 5. All ductile iron pipe shall have AWWA C104 cement mortar lining. Fittings shall be furnished as necessary in gravity mains to make connections and to conform with the plan layout. Fittings shall be mechanical joint or push-on or flanged, conforming to AWWA C111.

E. Special pipe and fittings. Wye and Tee Branches. Wye or tee branches shall be built into the main for use in making service connections. The openings in the wyes or tees for sanitary service pipes shall be six inches in diameter unless otherwise shown or specified. These openings, except in those that are to be used for extending laterals, shall be closed with air tight stoppers blocked to withstand air test pressures. Wyes shall be turned so that the branch is at an angle of 30 or 45 degrees with the horizontal. Branches shall be of the same material as the main for smaller diameter sewer. For larger diameter mains, special branch fittings shall be required and installed as specified.

When construction is within 50-feet of a potable water well, 200-feet of a municipal well, or otherwise requested by Engineer, pipe used shall comply with Wisconsin DCOM and Wisconsin Department of Natural Resources requirements.

To transfer from pipe specified under this section to pipe normally supplied, a transition pipe with suitable joints to mate the two different pipes shall be supplied. No field construction transitions will be allowed unless specified by Engineer. Construction shall not proceed until proper transition pipe is supplied. Band seal rubber couplings, as manufactured by Clow, Mission, or equal, with stainless steel ring and clamps may be used for pipes 15-inches and smaller in lieu of a transition pipe.

Special fittings shall be as called for on the drawings. All reinforcing to be cut in construction of fittings shall be lapped and welded to develop full strength of the reinforcing wire prior to cutting. Wall thickness of fittings when pipe is cut or jointed shall be 50% greater than the normal wall thickness for that size of pipe. The inside of pipe at bends shall be formed to a radius of at least 1/3 the pipe diameter. The full cross sectional area of the pipe interior shall be maintained at all points. Fitting materials, construction, and curing shall be as specified for straight pipe.

8.2.05 SANITARY SEWER STRUCTURES

Precast sewer access structures shall be of reinforced concrete and shall conform to the requirements of the Specification for Precast Reinforced Concrete Sewer Access Structure Section, ASTM C478. Standard manholes shall be constructed with eccentric cone top section of 48-inch diameter barrel sections. For other diameters, the top section shall be eccentric cone if available, flat slab, or as otherwise called for.

All joints between manhole pipe sections and top shall be tongue and groove. In sanitary sewer manholes, joints shall be sealed with circular O-ring conforming to ASTM C-443 or bituminous jointing material equal to Ram-Nek or Mas-Stik.

Manhole connections for sanitary sewer main shall be made using flexible, watertight connections, A-Lok, KOR-N-SEAL or approved equal.

Internal chimney seals shall be Cretex Specialty Products or approved equal.

Adjusting rings shall be Ladtech© HDPE adjusting rings or approved equal. An approved butyl sealant shall be placed in the annular space between the rings, the rings and the structure, and the rings and the casting.

8.2.06 CASTINGS

All sanitary sewer manhole castings shall meet the Standard Specifications for Gray Iron Castings, ASTM A48, Class 30. All castings unless otherwise specified, shall be Neenah Foundry R-1550, with Type “B” non-rocking, self-sealing sewer access structure lids with concealed pipe holes.

Non-rocking cast iron adjusting rings shall be as specified in SECTION 5 – PAVEMENTS.

8.2.07 SANITARY SEWER SERVICE LATERALS

Materials for sanitary sewer service laterals, within the right-of-way, shall conform to the requirements set forth in these specifications for sanitary sewer main.

ScotchMark Ball Markers, installed for locating purposes, shall be Product No. 1404-XR. Ball Markers shall be green in color.

Sewer saddles shall be Romac Industries Style “CB” or approved equal.

All plugs and caps shall be manufactured to fit the pipe used and shall be watertight.

8.3 EXECUTION

8.3.01 GENERAL

Before the start of construction, the Contractor shall verify existing sanitary sewers elevations with proposed plan elevations. All significant differences between existing storm sewer inverts and plan inverts (greater than 0.1") shall be reported to the Engineer.

Sanitary sewer shall be installed to an elevation tolerance of plus or minus 0.1 feet of the plan elevation or elevation provided on the grade sheet at any point along the main.

When a sanitary sewer crosses under a water main, provide a minimum of six (6) inches of separation between the bottom of the water main and the top of the sanitary sewer. When a sanitary sewer crosses over a water main, provide a minimum of 18 inches separation between the top of the water main and the bottom of the sanitary sewer.

8.3.02 HANDLING OF MATERIALS

Handle materials with care to avoid damage. Do not dump or drop materials. Remove all damaged or flawed materials from the site.

8.3.03 TRENCH

The width of trench below the outside top of the pipe shall be as shown in the following table for the sizes listed. A minimum clearance of eight inches between the outside of the pipe barrel and the trench wall at the pipe spring line shall be maintained. If sheeting is used, the trench width shall be measured as the clear distance between inside faces of the sheeting.

MAXIMUM WIDTH OF TRENCH BELOW TOP OF PIPE

Internal Pipe Diameter (inches)	Trench Width (inches)
4 -6	30
8 – 12	36
15	39
18 or larger	42

Not more than 200 feet of trench shall be opened at any one time. Not more than 100 feet of trench may be opened in advance of the completed pipe laying operations; and not more than one street crossing may be obstructed by the same trench at any one time.

8.3.04 PIPE BEDDING AND COVER

Bedding and cover material shall be provided for pipe, fittings and structures.

Provide a minimum of four (4) inches of bedding material under the pipe and fittings, and six (6) inches of bedding material under the structures. Bedding shall extend to the full width of the trench. Contractor shall perform all necessary excavation and shall furnish all required material to provide this bedding. If excavation is carried deeper than the required bedding thickness, the excess depth shall be backfilled with bedding material.

All trenches shall be backfilled by hand to one foot above the top of the pipe with approved cover material. Cover material shall be deposited in the trench for its full width on each side of the pipe, fittings and appurtenances simultaneously in six-inch layers and shall be compacted using hand tamping bars and/or mechanical tampers.

8.3.05 GRANULAR BACKFILL

Granular Backfill shall extend from one-foot above the pipe to the proposed pavement or hard surface subgrade and within the surfaces zone of influence. Compaction of Granular Backfill material shall meet 95% Modified Proctor, the standard specification of ASTM D-1557, within three (3) feet of the pavement or hard surface subgrade. Compaction of Granular Backfill material shall meet 90% Modified Proctor, the standard specification of ASTM D-1557, in the cross-sectional area of the trench between one-foot above the pipe and the plane three (3) vertical feet from the proposed pavement or hard surface subgrade.

8.3.06 BACKFILL

When the type of backfill material is not otherwise specified, excavated material may be used for Backfill Material as long as it meets the requirements of 8.2.03 BACKFILL MATERIAL. Compaction of Backfill Material shall meet 90 % Modified Proctor, the standard specification of ASTM D-1557.

8.3.07 SANITARY SEWER PIPE AND FITTINGS

Lay pipe uniformly to line and grade so that the finished sewer presents a uniform bore. Noticeable variations from true alignment and grade will be sufficient cause for rejection of the work.

Commence at the lowest point and proceed to the upper end. Lay pipe with bell-end pointing up-grade.

When work is stopped for any reason, securely plug the end of the pipe.

8.3.08 SEWER STRUCTURES

The interior bottom of manholes shall be constructed of concrete fillets poured-in-place in the field. Flow lines shall be made smooth with uniform curves to promote flow through the manhole. Sewer mains shall project a minimum of two (2) inches inside the manhole wall and in all cases where possible, shall extend through the manhole to aid in finishing of the manhole bottom. Pre-cast inverts shall be allowed if approved in advance by the Engineer. Engineer retains sole discretion as to acceptability of pre-cast inverts as installed.

Outside Sewer Drops entrances shall be installed where indicated on drawings. Outside drops shall be used and shall be of the same diameter as the sewer main for pipe 12-inch and smaller.

Sanitary sewer structures shall have a minimum of three (3) inches and a maximum of nine (9) inches of adjusting rings. An approved butyl sealant shall be placed in the annular space between the rings, the rings and the structure, and the rings and the casting. All adjustment for matching road grade shall be made by utilizing a molded and indexed slope ring. Adjusting rings shall be installed per manufacturer's specifications.

Internal chimney seals shall be installed per manufacturer's specifications in all manhole structures.

8.3.09 CASTINGS

Sanitary manhole castings, in roadways temporarily receiving binder coarse only, shall be set to binder grade. Sanitary manhole castings shall be set ¼" below final grade in all other areas unless otherwise directed by Engineer. "Scab" and monolithic ramping is prohibited.

Sanitary manhole castings set to binder grade, shall be brought to ¼" below surface grade immediately prior to placement of surface coarse, with non-rocking cast iron adjustment rings.

8.3.10 SANITARY SEWER LATERALS

Unless otherwise stated by Engineer, service laterals shall be installed within the right-of-way or easement to serve all existing buildings and all platted lots. Service laterals shall consist of a branch fitting at the main and extension of the specified lateral pipe to the end

of lateral as called for and requested. All necessary fittings shall be furnished and installed to complete the installation.

All sanitary sewer service lateral connections to existing sanitary sewer mains, of non-PVC material, shall be cored and the specified sewer saddle shall be installed unless otherwise directed by Engineer. For sanitary sewer lateral connections to existing PVC sanitary sewer mains, SDR 26 wyes shall be cut in and installed with the use of SDR 35 couplings. Use of Ferncos is prohibited on PVC pipe.

Lay sewer laterals uniformly to line and grade so that the finished sewer presents a uniform bore. Noticeable variations from true alignment and grade will be sufficient cause for rejection of the work. Commence at the lowest point and proceed to the upper end. Lay lateral pipe with bell-end pointing up-grade. When work is stopped for any reason, securely plug the end of the pipe.

The ends of all laterals shall be plugged and blocked to resist air test pressure if required. All plugs shall be manufactured to fit the pipe used and shall be watertight.

Laterals shall be extended 10 feet beyond the right-of-way or easement line, whichever is further from the roadway centerline.

The sanitary lateral stubs shall be marked with a 4" x 4" wood post, placed vertically at the invert and extending two feet (2') above ground. All sanitary lateral stubs shall be painted green.

Locating markers shall be installed directly above sanitary laterals two feet from property line (within right-of-way) and at all horizontal bends. Markers shall be installed between 3.5' and 4.5' from final surface elevation. Markers shall be checked for conductivity prior to installation of streets.

See Section 7.3.10 for sanitary sewer lateral distance requirements from water services.

8.3.11 ABANDONMENT

A. Sanitary Sewer Mains. Sanitary sewer mains, to be abandoned, shall be capped unless otherwise directed by Engineer.

B. Structures. The casting, all adjusting rings, and the top three (3) feet of the structure shall be removed. Castings are the property of the City. A hole shall be cut into the bottom of the structure to accommodate drainage through the structure. All openings within the structure shall be plugged with concrete. The entire structure shall be completely filled in with granular material or cellular concrete. All disturbed areas shall be backfilled with the required backfill material.

C. Sanitary Sewer Laterals. Sanitary sewer laterals, to be abandoned, shall be capped unless otherwise directed by Engineer. Sanitary laterals shall be abandoned at the main unless otherwise directed by Engineer. Laterals that are located under hard services shall be capped as close to the street edge as allowable and an approved three (3) foot liner shall be installed in the main to seal off the lateral as directed by the Engineer.

8.4 FIELD QUALITY CONTROL AND TESTING

8.4.01 TESTING REQUIREMENTS

All sanitary sewers shall be mandrel tested, low pressure leakage tested, and televised.

8.4.02 TELEVISING

Closed circuit television shall be utilized for inspecting the interior of all completed sections of the mains and services, eight inches (8") and larger in diameter. Televising shall take place after all underground utilities have been installed, backfilled and compacted to subgrade, after all sanitary sewer has been jetted cleaned, and prior to placement of pavement. Audio-visual Digital Video Display (DVD) recordings of these inspections and written and pdf logs of same shall be submitted to the Engineer prior to the Contractor's request for a final inspection of the project. The DVD recordings and written and pdf logs submitted to the Engineer shall exclusively be for sanitary sewer, DVD recordings and written and pdf logs for storm sewer shall be submitted separately. Inspection records shall be of suitable format, and shall include, but not necessarily be limited to, the following data:

Project Title, Owner Name
Date of Inspection, Type of Pipe and Size
Weather
Names of Inspectors and Technicians
Location of Line
Manhole Numbers, Section Length
Direction of Inspection and Measurements
Location, size, and direction of all laterals, including laterals extending from manholes
General Condition of Line
Deflections (vertical and horizontal)
Joint Conditions
Points of Infiltration, Locations of Obstructions

The television camera used shall be specifically designed and constructed for sewer inspection and shall take picture in color. Black and white shall not be accepted. Lighting for the camera shall be operative in 100 percent humidity conditions. The camera shall have a minimum of 600 lines of resolution. Picture quality and definition shall be to the complete satisfaction of the Owner. The improvements shall not be eligible for acceptance prior to Contractor's submission of televising records which are deemed satisfactory by the Owner.

The Contractor shall, prior to televising, deposit into the new sewer mains and services a minimum amount of water as directed by the Engineer to allow for indication of sags in the pipe.

DVD records shall be made of all sections of the new sewer main and services. The video shall be made continuously as the camera is pulled or driven through the line and shall include a panorama view of each manhole. Each recording shall be in DVD format and shall be numbered and dated. A list shall be provided on the container for each DVD indicating the DVD number, project name and sections of sewer included. All recordings shall be made on new DVDs and the DVDs shall become the property of the Owner. The Contractor shall be responsible for supplying all safety equipment necessary to complete the work in compliance with applicable OSHA and IHLR standards.

8.4.03 LOW PRESSURE LEAKAGE TESTING

The leakage test shall conform to the requirements of WUCA Specifications, Chapter 3.7.0. The costs of this work shall be at Contractor's expense.

8.4.04 MANDREL TESTING

A deflection testing mandrel shall be used to determine whether the vertical deflection of installed polyvinyl (PVC) sewer pipe exceeds the maximum allowable vertical deflection. The deflection of the pipe shall not exceed that which will permit the free passage of the mandrel through the pipe. The mandrel specifically designed for SDR 26 shall be used. Testing shall take place thirty (30) days after pipe installation unless directed otherwise by Engineer. All pipe that exceeds the maximum vertical deflection shall be repaired, backfilled, and mandrelled by Contractor prior to acceptance. The costs of this work shall be at Contractor's expense.

END

SECTION 9 - STREET LIGHTING

9.1 GENERAL

9.1.01 RELATED DOCUMENTS

City of Madison Standard Specifications for Public Works Construction, latest revision

9.1.02 DESCRIPTION OF WORK

The Contractor shall be responsible for production and approval of Shop Drawings; ordering, delivery, and coordination with MG&E as indicated below for each individual light style; and for conformance with the Specifications contained herein and the Plans. The Engineer reserves the right to modify the Specifications as necessary for each individual project.

9.2 MATERIALS

9.2.01 ORDERING AND PURCHASING

The materials specified are for information purposes only. All street lighting materials will be ordered and purchased directly by the City of Fitchburg. Type C and E materials will be purchased from the City of Madison. In the case of a new subdivision, the Developer will be billed by the City of Fitchburg for all expenses that are incurred.

9.2.02 TYPE A - RESIDENTIAL (18' Aluminum Pole, Hood Style)

A. Fixture: American Electric #245-56215-8A
Primary Voltage / Wattage: 120V, 100W
Ballast Type: Regulated
Standard Distribution Pattern: IES, Type V
Standard Finish: Munsell Grey
Hood Style: Top Required

B. Pole: Lexington #1708-30504TE
Material: Spun-Tapered 6053 Aluminum Alloy tubing, Heat treated (T6 temper)
Finish: Satin Brush
Embedment: Direct
Overall Shaft Length: 21' 8", Nominal Mounting Height: 18 feet
Handhole: required
Ground Lug: required

C. P.C. Sensor: Fisher Pierce #7760-SSS (ordered separately)
Control Voltage: 120V
Lightning Arrestor: Open-type, Modified Expulsion
Turn-On: 1 foot-candle nominal, Turn-Off: 3 X (avg.)

D. Lamp: General Electric LU 100

9.2.03 TYPE B - RESIDENTIAL (20' Concrete Pole, King Luminaire)

A. Fixture: King Luminaire #K56-SR-EAO-Type 3-150MOGHPS120KA5PE

Lantern Type: Tudor with spurs
Metal Components: Heavy Duty Cast Aluminum, Black
Primary Voltage / Wattage: 120V, 150W HPS
Standard Distribution Pattern: IES, Type III
Photoelectric Control Sensor included
Panel Material: Acrylic
Options: P.E. - Twistlock Receptacle C/W Photo Eye

B. Pole: Stresscrete Sheridan# KS15-G-E40. S/F KA5
Material: Spun Concrete
Finish / Color: Etched, E40; Pearl Grey
Embedment: Direct, 3' 6" burial required
Dimensions: 19' 6" overall, 16' installed
Handhole: required
Ground Lug: required

C. P.C. Sensor: Included with fixture

D. Lamp: General Electric LU 150/55

9.2.04 TYPE C - RESIDENTIAL (29' Concrete Pole, 4' or 6' Arm, Cobra Head CUTOFF)

A. Fixture: Primary Voltage / Wattage: 120V, 100W HPS, CUTOFF

B. Pole: Concrete Octagonal
Material: Spun Concrete
Embedment: Direct, 5’ burial required
Dimensions: 29' overall, 24' mounting

C. P.C. Sensor: Included with fixture

D. Lamp: General Electric LU 100 (included with fixture)

9.2.05 TYPE D - COMMERCIAL (30' Aluminum Anodized Pole, Concrete Base, Breakaway)

A. Fixture A: Cooper Utility Lighting, Cirrus Arm Mount #CAS15HPSCWI22D4L
Primary Voltage / Wattage: 120V, 150W
Ballast Type: Regulated
Standard Distribution Pattern: IES, Type III
Finish: Medium Bronze Anodic
Ballasts: Required

B. Fixture B: Edge LED #ARE-EDG-2S-DL-12-D-UL-BZ-350
Primary Voltage / Wattage: 120-277V, 132W
No. of LEDs: 120
Standard Distribution Pattern: IES, Type II Short
Finish: Anodized Medium Bronze
Ballasts: Required

C. Pole: HAPCO RTA30C8B4-A3
Material: Spun-Tapered Aluminum Alloy tubing
Finish: Medium Bronze Anodic
Nominal Mounting Height: 30 feet, Shaft Diameter: 8"

Handhole: required
Vibration Damper: Option "V" required
Transformer Base: HAPCO TB2-17 #70511P33/73154, medium bronze finish to match pole.

D. P.C. Sensor: Fisher Pierce #7760-SSS (ordered separately)
Orientation: North
Control Voltage: 120V
Lightning Arrestor: Open-type, Modified Expulsion
Turn-On: 1 foot-candle nominal
Turn-Off: 3 X (avg.)

E. Lamp: General Electric LU 150

9.2.06 TYPE E – RESIDENTIAL/COMMERCIAL (30' Galvanized Steel Pole, 10' Arm, Cobra Head CUTOFF, Concrete Base, Breakaway)

A. Fixture: Primary Voltage / Wattage: 120V, 150W HPS, CUTOFF

B. Pole: Material: Galvanized Steel
Dimensions: 30' mounting
Transformer Base: City of Madison Standard

C. P.C. Sensor: Included with fixture

D. Lamp: General Electric LU 150

9.2.07 TYPE F – RESDENTIAL/COMMERCIAL (29' Concrete pole w/scroll arms w/Sternberg Fixtures)

A. Fixture: Sternberg 1940/AHS (Slipfit 2 3/8" Tenon)/150 WHPSMT/RO3/VG
Primary Voltage / Wattage: 120V, multitap, 150W
Ballast Type: Regulated
Standard Distribution Pattern: Sag Lens/RO3H-S/Type III
Finish: Antique Verde Green
Ballasts: Required

B. Pole: Concrete Straight taper Octagonal / w 3" OD by 5" tall tenon
Material: Spun Concrete
Embedment: Direct, 5' burial required
Dimensions: 29' overall, 24' mounting

C. P.C. Sensor: Mounted on center cap of scroll

D. Lamp:150 W HPS – General Electric LU 150 Medium base

9.2.08 METERED STREET LIGHT CONTROLLER

Cabinet shall be Millbank #CP3B5111FB22DGWESP, 120/240 VAC, 100 Amps max, single phase. Cabinet shall be dark green. Meter Socket shall be 41" ringless lever bypass style centered in the window.

9.3 EXECUTION

9.3.01 DELIVERY AND INSTALLATION

A. All lighting in new plats in the MG&E service area. Installation of street lighting, wiring and appurtenances shall be completed by MG&E. City staff will coordinate the installation with MG&E. The street light pole installation shall be installed by contractor. All energizing shall be done by MG&E.

B. All lighting in existing streets/parks and/or Alliant service area. These areas will be handled on an individual basis. The City allows the underground and all other appurtenances related to the street lighting, to be bid. For the most part, the specifications follow City of Madison's Street light Specification.

City staff must be contacted a minimum of 30 days prior to intended commencement of wiring or light installation activities to allow for City's authorization to proceed for MG&E and subsequent scheduling.

9.3.02 STREET LIGHT LOCATIONS

Street light poles and/or bases at intersections shall be located such that the clear horizontal distance between the pole or base and the back of curb is 48 inches, or as designated by the Engineer. Street light poles and/or bases which are not located at intersections shall be placed such that the clear horizontal distance between the pole or base and the back of curb is 36 inches, or as designated by the Engineer.

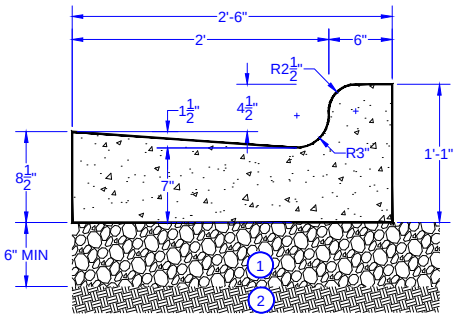
9.3.03 CONCRETE BASES

A. TYPE D & E Concrete Bases. Concrete bases shall be constructed by the Contractor in accordance with *City of Madison Standard Specifications for Public Works Construction*, latest revision, Type LB8, with the following modifications:

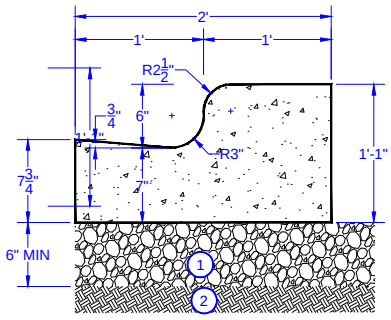
- 1" x 48" Anchor bolts with 3" of thread at top and 4" L-Bend at bottom.
- 12" Bolt Circle

Concrete base forms shall be stripped to 12 inches below ground level.

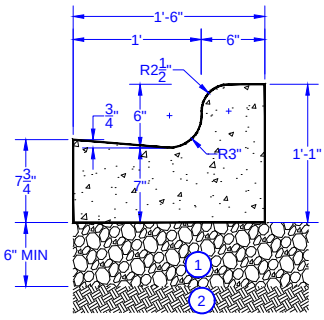
END



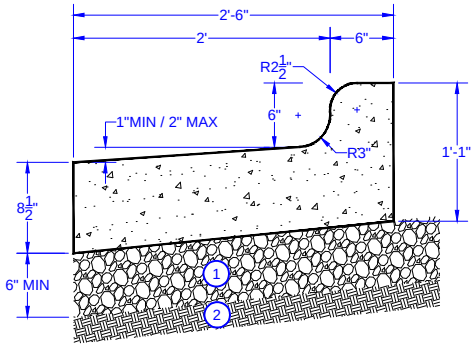
30" CONCRETE CURB & GUTTER



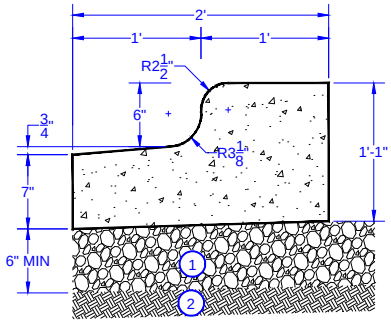
24" CONCRETE CURB & GUTTER



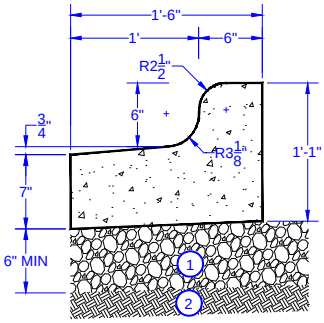
18" CONCRETE CURB & GUTTER



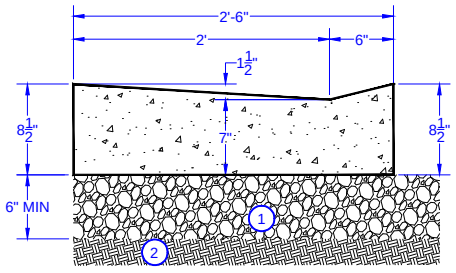
30" C&G REJECT SECTION



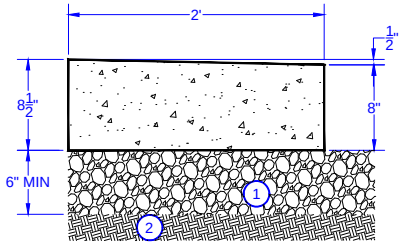
24" C&G
REJECT SECTION



18" C&G
REJECT SECTION



30" DRIVEWAY SECTION



24" GUTTER

1. Dense Graded Base 1-1/4" (Typ.), Shall be provided 12-inches beyond the back of curb
2. Compacted Sub Base

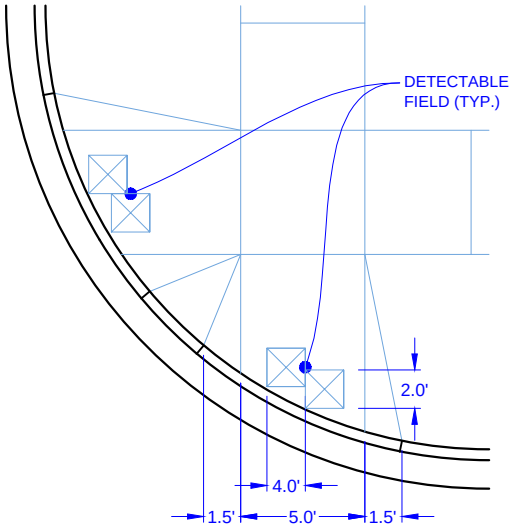
THE CITY OF Fitchburg
PUBLIC WORKS

CONCRETE CURB AND GUTTER

STANDARD DETAIL DRAWING

DATE: 1/24/2014

SHEET NO.: 4.01



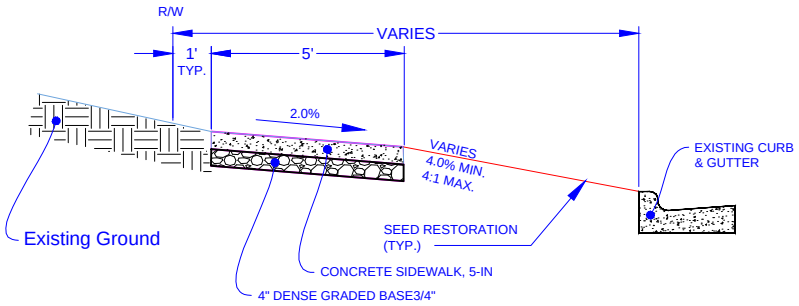
TYPE 2 RAMP
PLAN VIEW

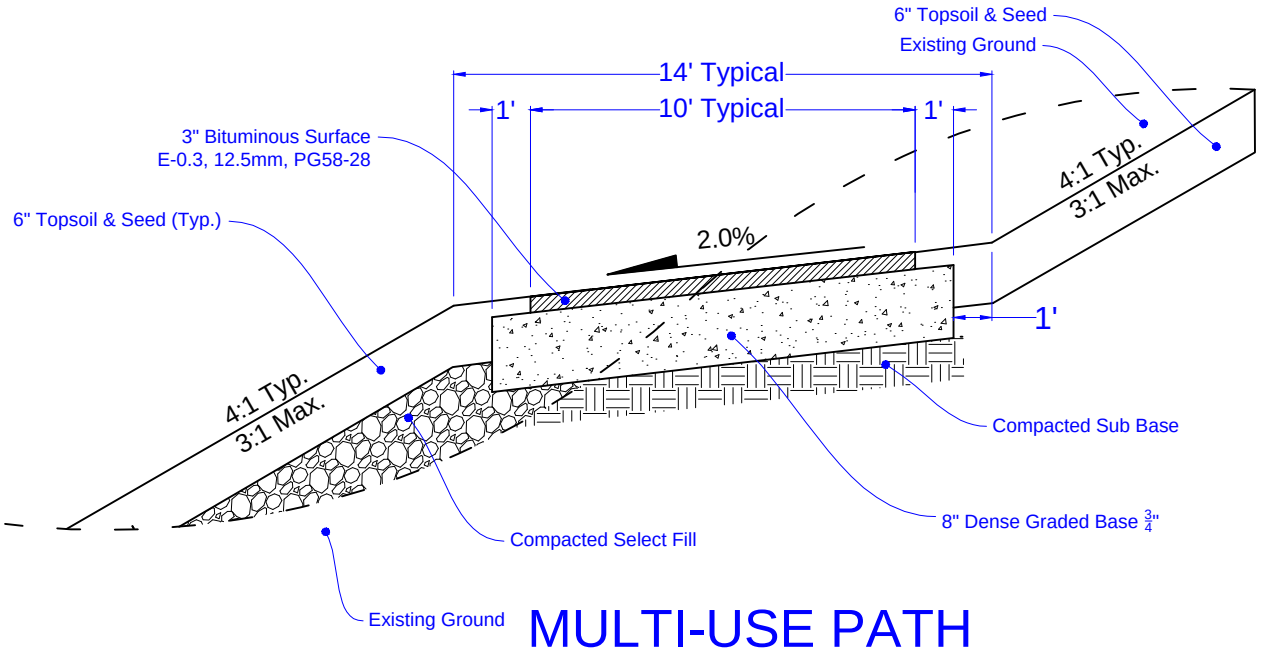
GENERAL NOTES FOR ALL SIDEWALK RAMPS

1. Install curb cuts at sidewalk ramps with either full removal and replacement or by "sawcutting" the curb head.
2. Curb tapers at curb cuts shall be 18" unless otherwise directed by the Engineer.
3. The width of the flat bottom of the ramp at the curb shall be 60" minimum.
4. The maximum slope of the ramp between the back of the curb and the front of the detectable warning field shall not exceed 2%. The maximum slope of the ramp between the front of the detectable warning field and the sidewalk shall not exceed one inch per foot.
5. All handicap ramps shall include detectable warning fields with truncated domes.
6. Detectable warning field shall be oriented in a manner that it is parallel to the direction of pedestrian traffic. When curb is perpendicular to direction of pedestrian traffic, install detectable warning field tight to back of curb. When curb is not perpendicular to the direction of pedestrian traffic, stager detectable warning field panels to minimize space between detectable warning field panels and back of curb.
7. For a sidewalk ramp, detectable warnings shall be a minimum of 4' x 2'. For a bike path ramp, detectable warnings shall be a minimum of 8' x 2'.
8. When conditions require more information, refer to "UFAS" (Uniform Federal Accessability Standards).

GENERAL NOTES FOR ALL SIDEWALK

1. Sidewalk thickness shall be 7-inches through driveways, 6-inches at ramps, and 5-inches for all public sidewalk.
2. Sidewalk cross-slope shall not exceed 2.0%.
3. Provide a 1/2" expansion joint at all ramp locations, through driveways, against the curb and gutter, and every 200' of the sidewalk.
4. Construction forms shall be equal to or greater than the sidewalk thickness.





MULTI-USE PATH

THE CITY OF Fitchburg
PUBLIC WORKS

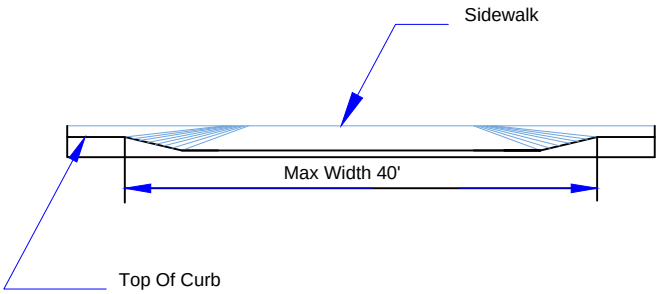
SIDEWALK & PATHS

STANDARD DETAIL DRAWING

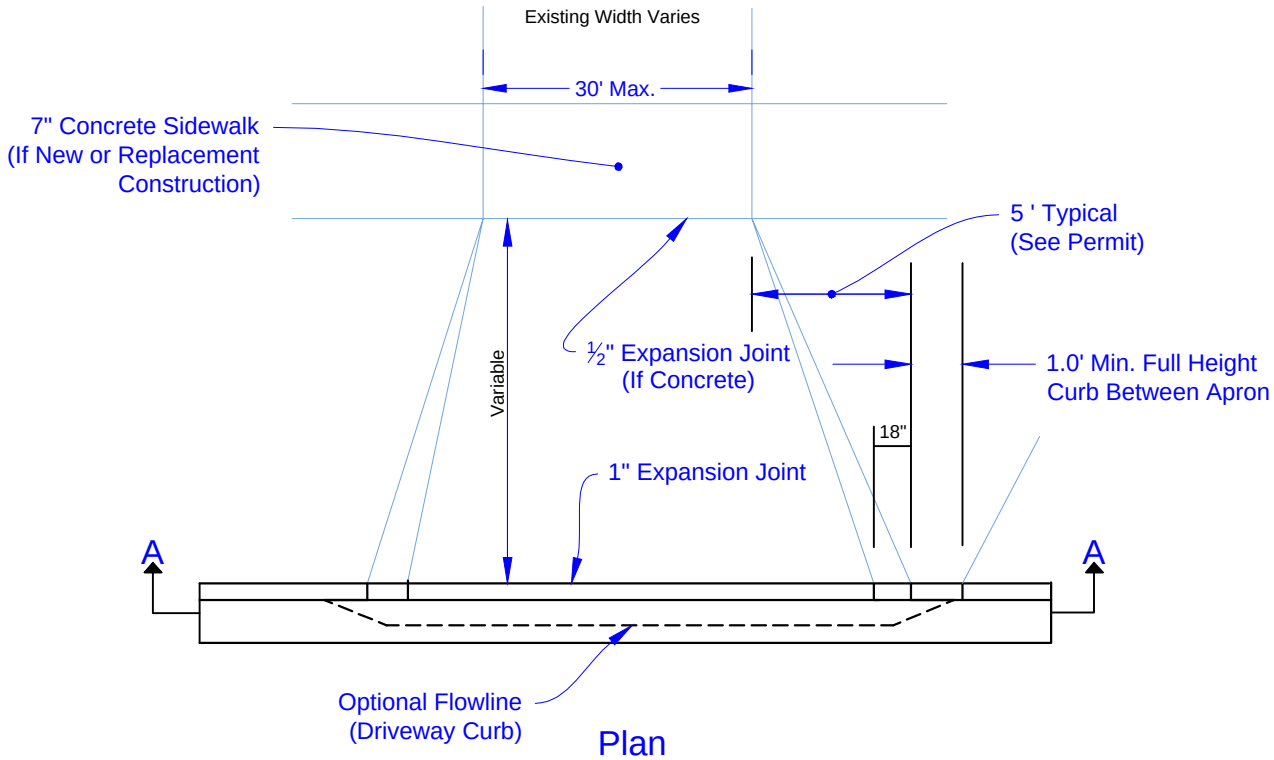
DATE: 1/24/2014

SHEET NO.: 4.02

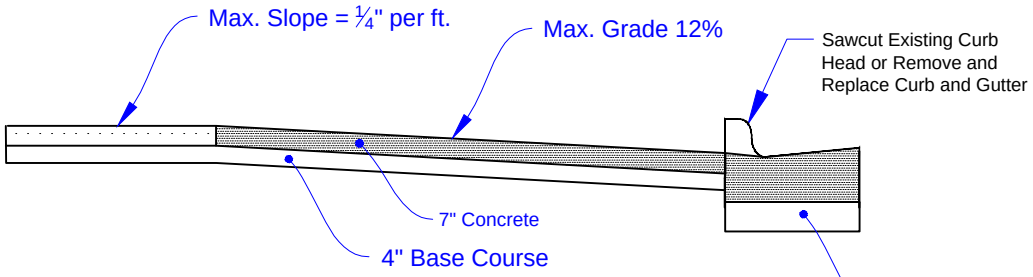
Commercial Driveway Detail



Section A-A



Plan



Profile

THE CITY OF Fitchburg
PUBLIC WORKS

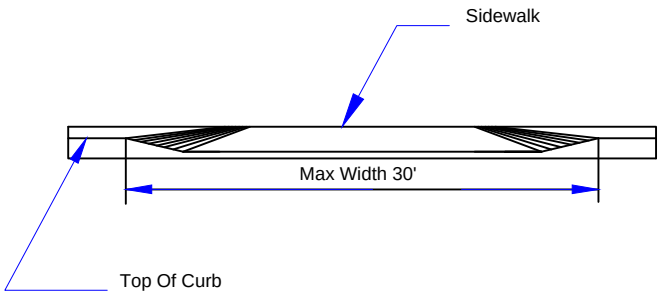
COMMERCIAL DRIVEWAY

STANDARD DETAIL DRAWING

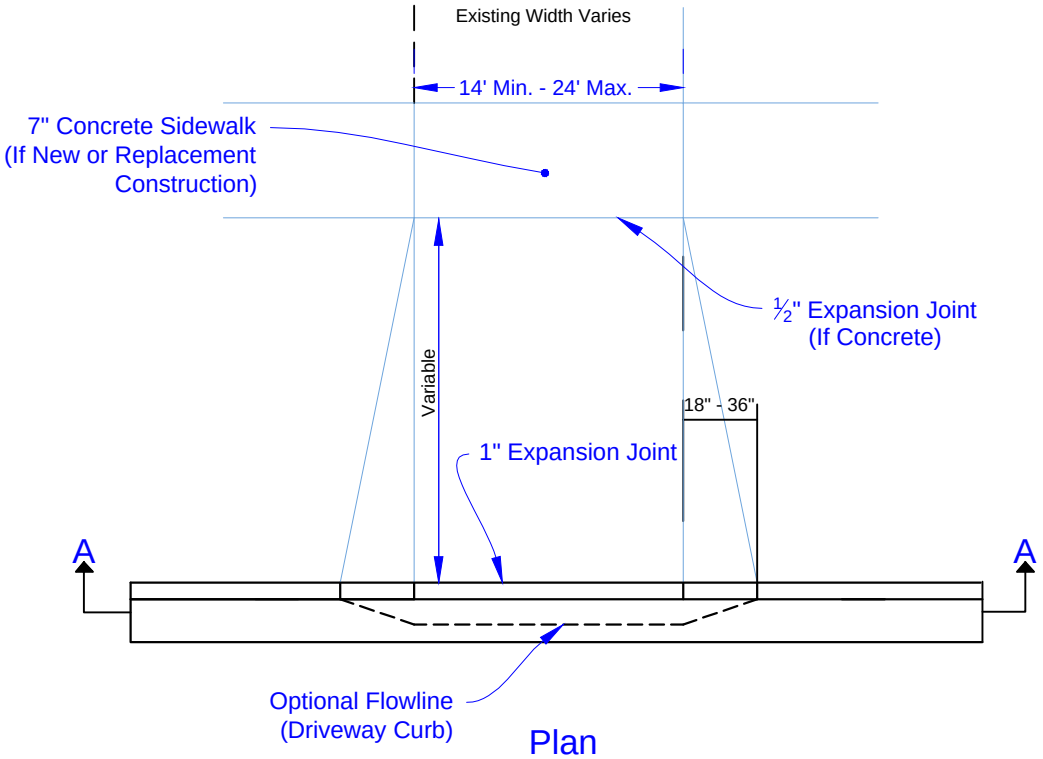
DATE: 1/24/2014

SHEET NO.: 4.03

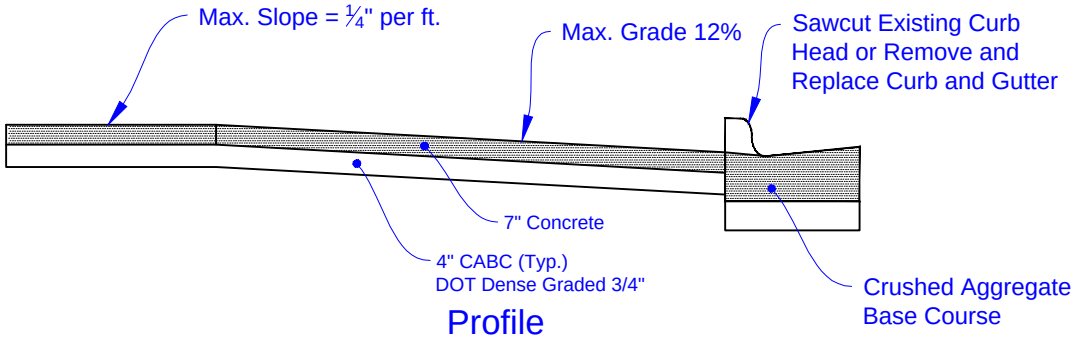
Residential Driveway Detail



Section A-A



Plan



Profile

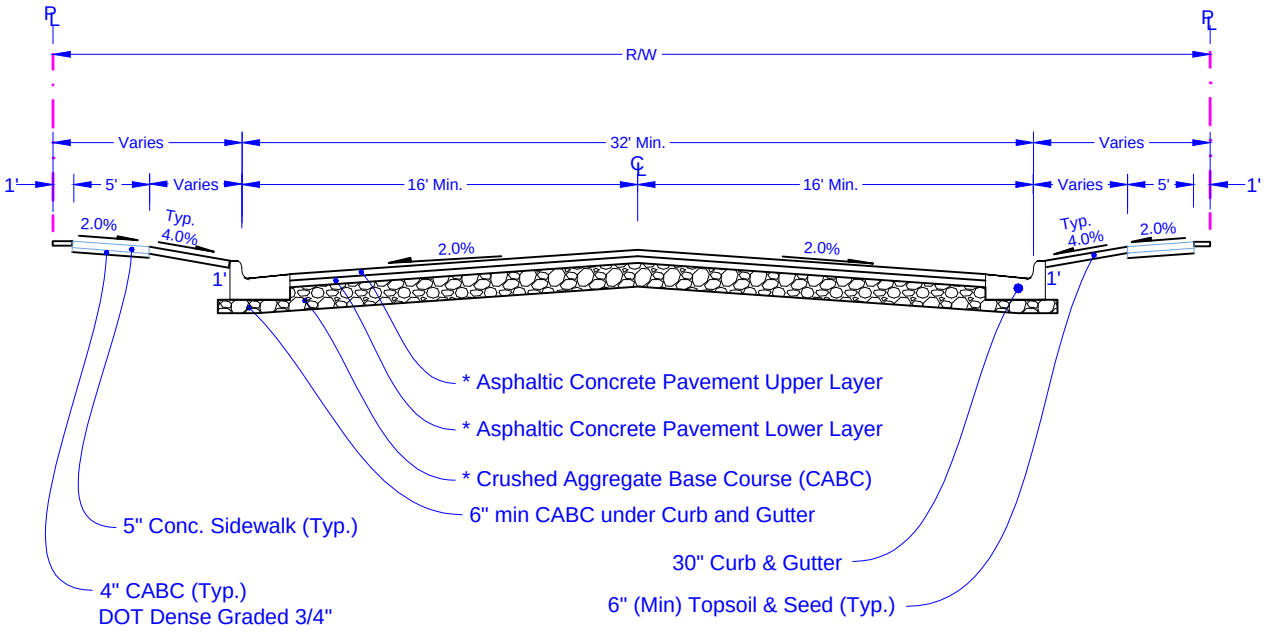
THE CITY OF Fitchburg
PUBLIC WORKS

RESIDENTIAL DRIVEWAY

STANDARD DETAIL DRAWING

DATE: 1/24/2014

SHEET NO.: 4.04



* City of Fitchburg Minimum New Pavement Design

Type	Crushed Aggregate Base Course		Asphaltic Concrete Pavement				
	Lower Layer Dense 3"	Upper Layer Dense 1 ¼"	Lower Layer		Upper Layer		Asphalt Material
			Type	Thickness	Type	Thickness	
Residential	7"-8"	4"-5"	E-1	2 ¼"	E-1	1 ¾"	PG 58-28
Collector	7"-8"	4"-5"	E-1	2 ¾"	E-1	1 ¾"	PG 64-22
Arterial	7"-8"	4"-5"	E-3	3"	E-3	2 ¼"	PG 64-22

*Note: All cul-de-sac bulbs shall increase binder and surface by 1/4"
-A total of 4" in this area.

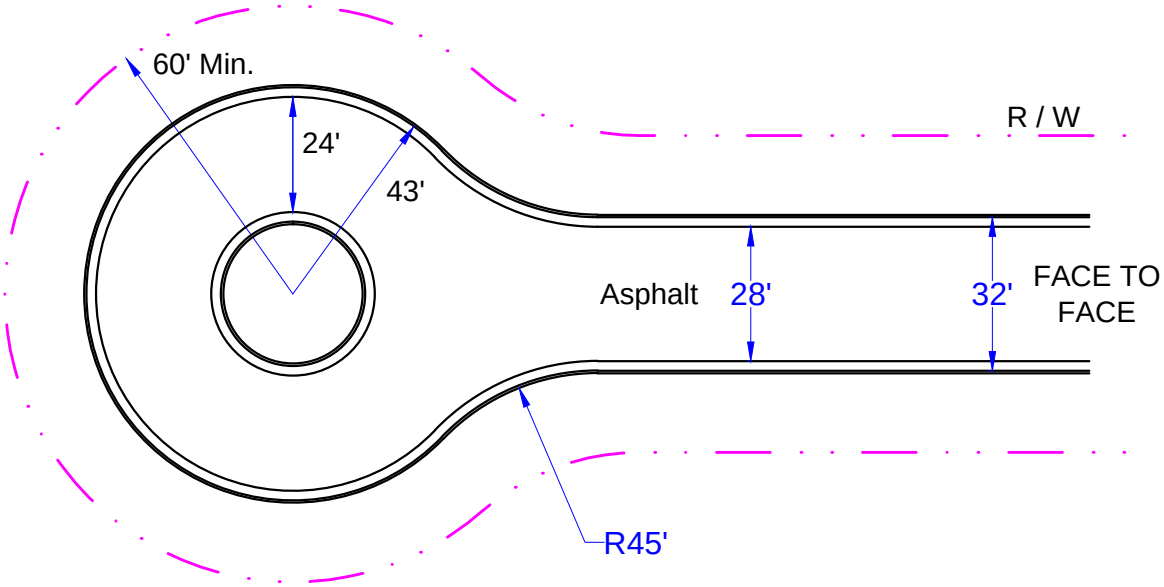
THE CITY OF Fitchburg PUBLIC WORKS

STREET TYPES

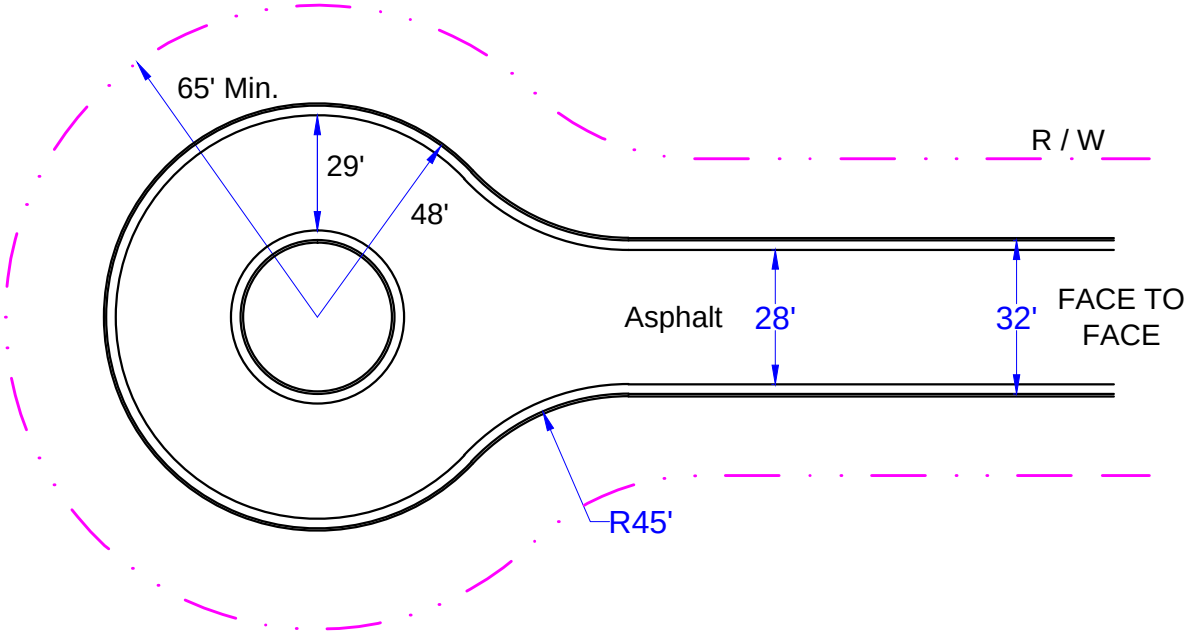
STANDARD DETAIL DRAWING

DATE: 1/24/2014

SHEET NO.: 5.01



RESIDENTIAL
CUL-DE-SAC



COMMERCIAL
CUL-DE-SAC

THE CITY OF Fitchburg
PUBLIC WORKS

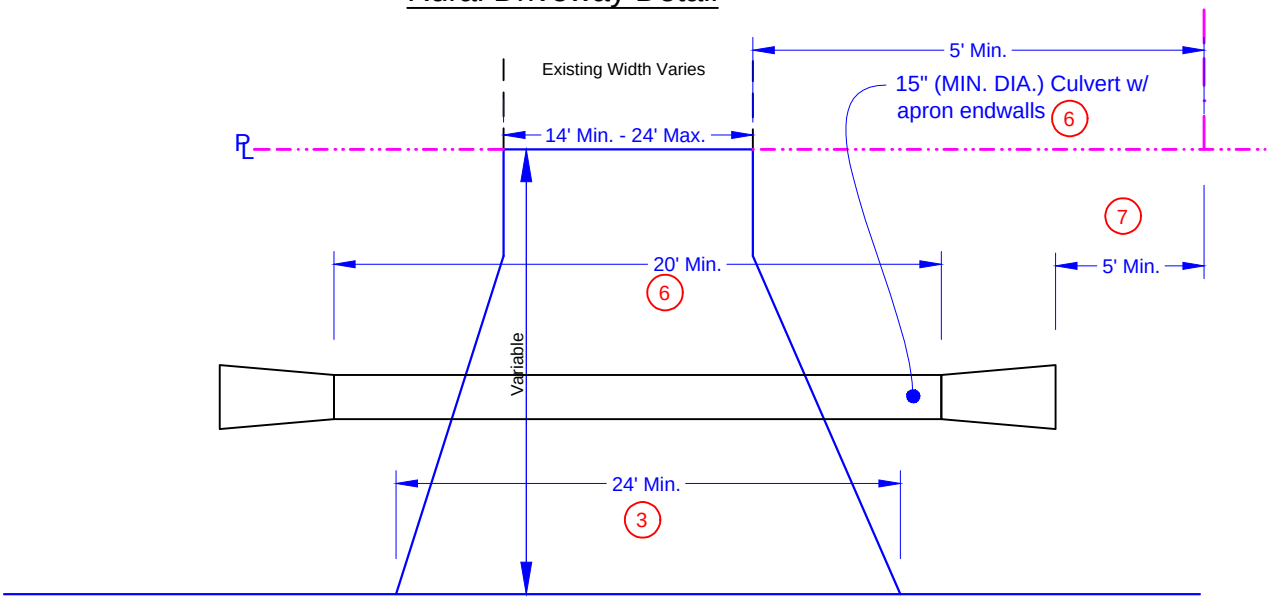
CUL-DE-SAC TYPES

STANDARD DETAIL DRAWING

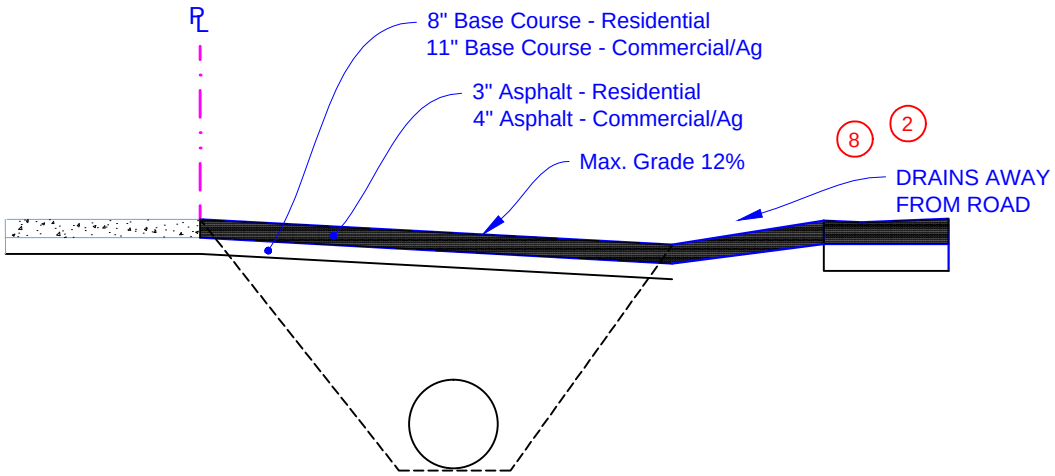
DATE: 1/24/2014

SHEET NO.: 5.02

Rural Driveway Detail

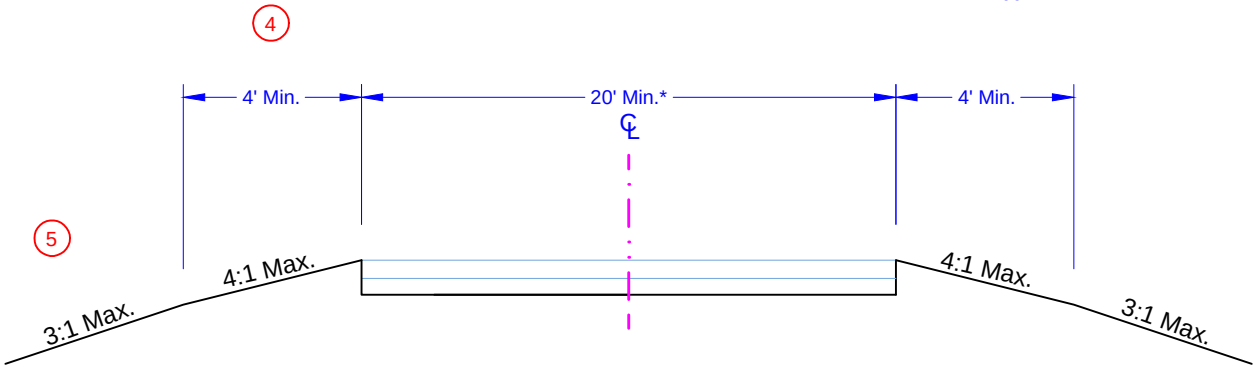


Plan



Profile

3 *20' Min. IF DRIVEWAY IS LONGER THAN 100'



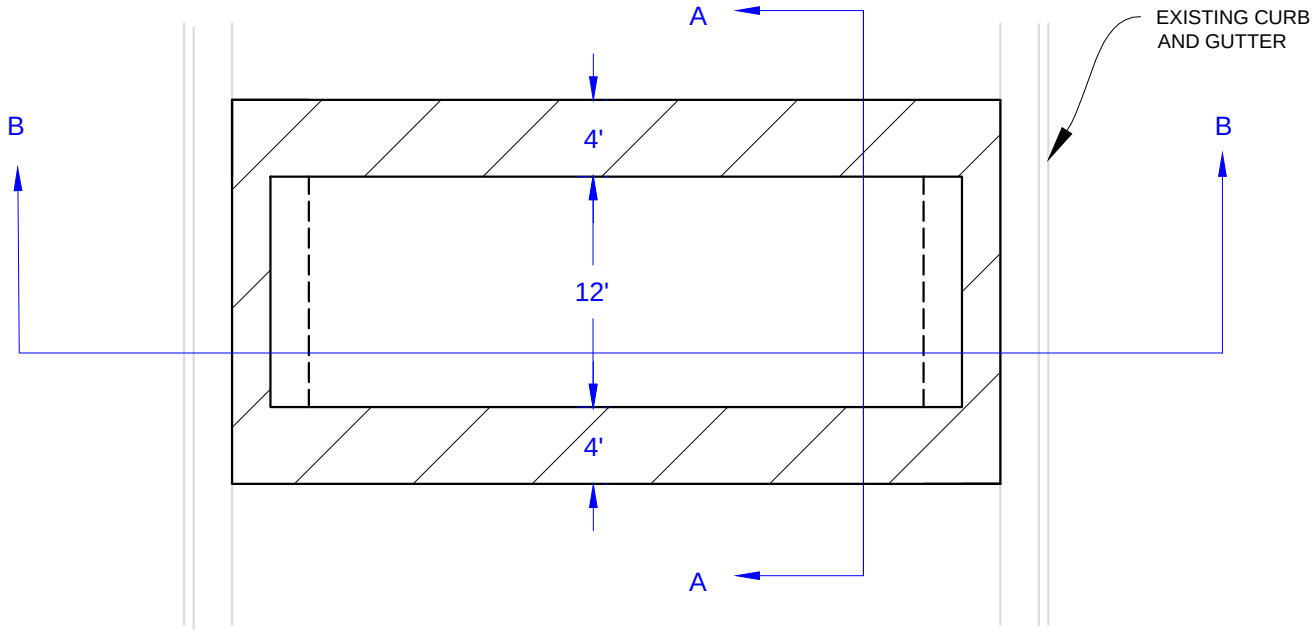
THE CITY OF Fitchburg PUBLIC WORKS

RURAL DRIVEWAY

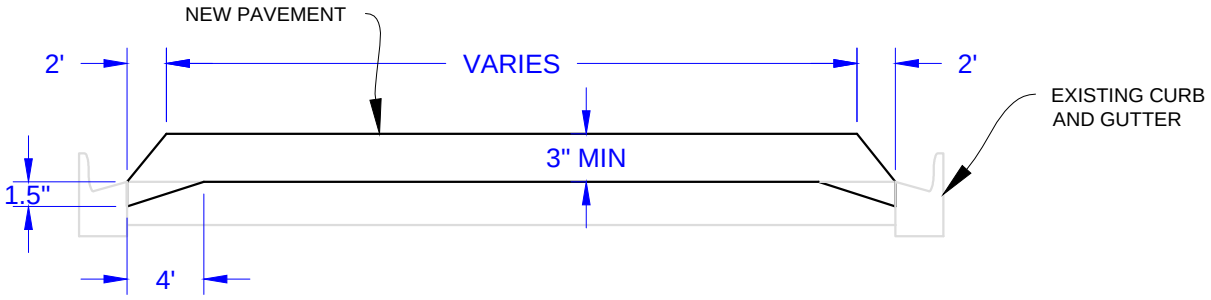
STANDARD DETAIL DRAWING

DATE: 1/24/2014

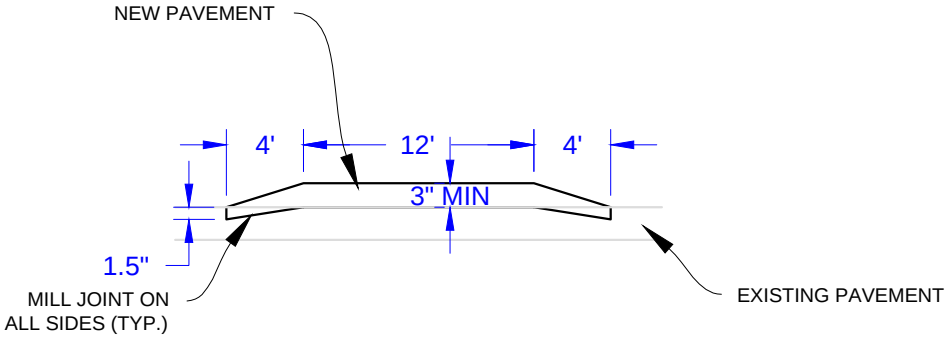
SHEET NO.: 5.03



PLAN VIEW



SECTION B-B



SECTION A-A

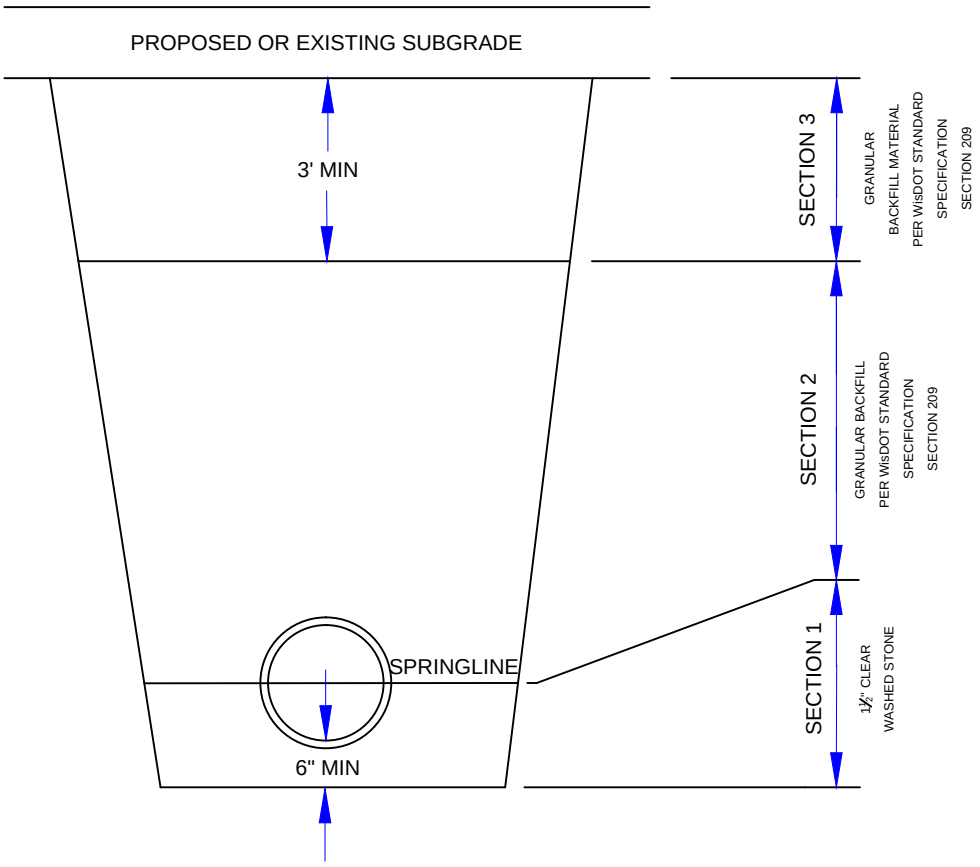
THE CITY OF Fitchburg
PUBLIC WORKS

TYPICAL SPEED TABLE

STANDARD DETAIL DRAWING

DATE: 1/24/2014

SHEET NO.: 5.04



STANDARD TRENCH COMPACTION

ALL BACKFILL MATERIAL SHALL BE PLACED IN LIFTS NOT TO EXCEED 12" BEFORE COMPACTION UNLESS AUTHORIZED BY THE ENGINEER DUE TO THE CHARACTER OF THE MATERIAL AND THE COMPACTING EQUIPMENT. EACH LIFT SHALL BE MECHANICALLY COMPACTED TO THE REQUIRED DENSITY PRIOR TO PLACING SUCCEEDING LIFTS OF BACKFILL MATERIAL.

SECTION 1:

MINIMUM COMPACTION 95% MAXIMUM DENSITY.
COMPACTION OF BACKFILL WITH BOMAG OR HOE-PAC SHALL NOT BEGIN UNTIL THE DEPTH OF BACKFILL MATERIAL IS TWO (2) FEET ABOVE THE TOP OF PIPE.

SECTION 2:

MINIMUM COMPACTION 90% MAXIMUM DENSITY.

SECTION 3:

MINIMUM COMPACTION 95% MAXIMUM DENSITY.

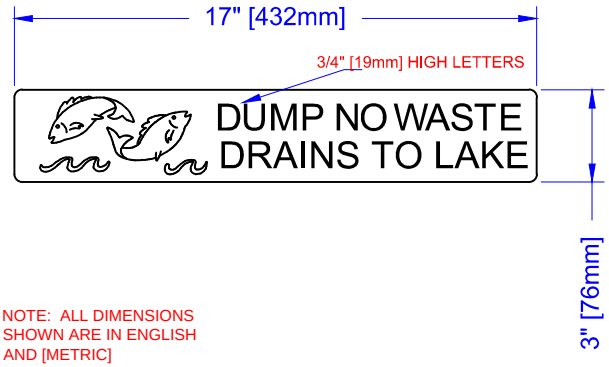
THE CITY OF Fitchburg
PUBLIC WORKS

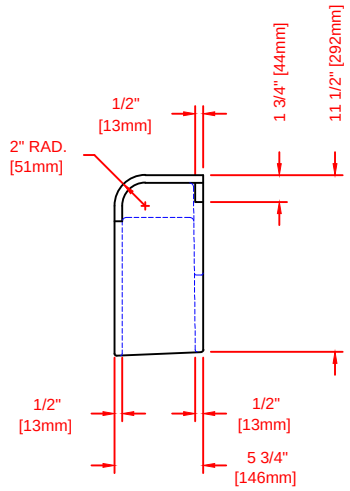
STORM SEWER TRENCH

STANDARD DETAIL DRAWING

DATE: 1/24/2014

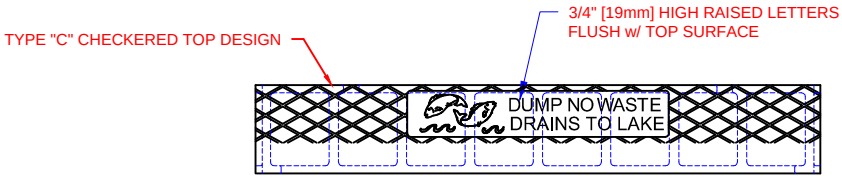
SHEET NO.: 6.01



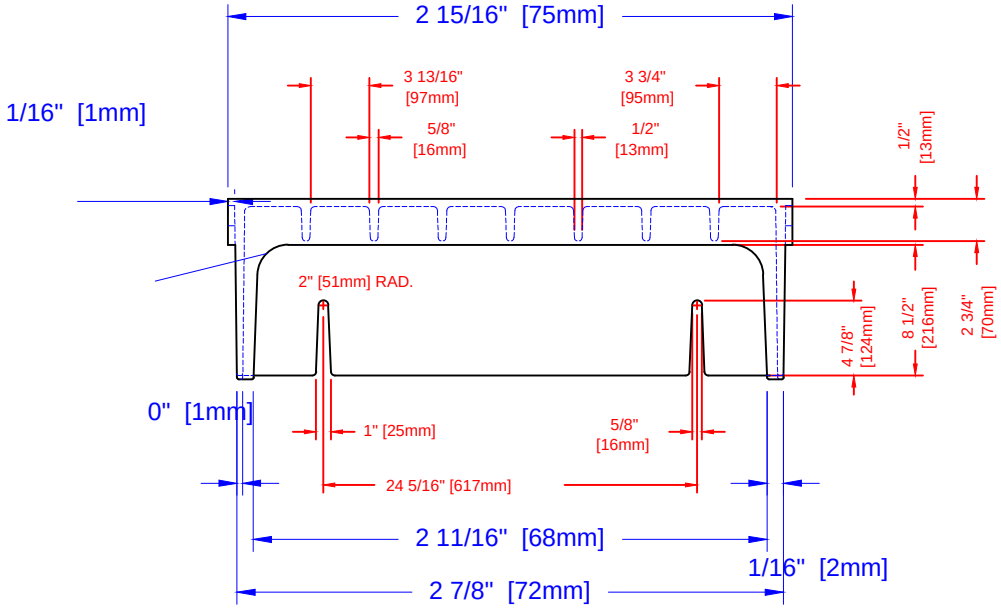


SIDE VIEW

NOTE: ALL DIMENSIONS
SHOWN ARE IN ENGLISH
AND [METRIC]
MATERIAL: CAST GRAY
IRON ASTM A-48, CLASS 35B
FINISH: NO PAINT
WEIGHT: 126#



TOP VIEW



FRONT VIEW

THE CITY OF Fitchburg
PUBLIC WORKS

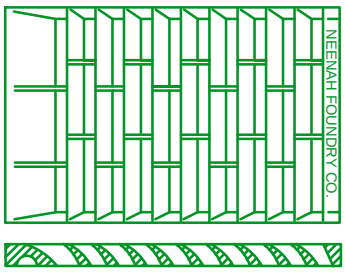
CURB BOX

STANDARD DETAIL DRAWING

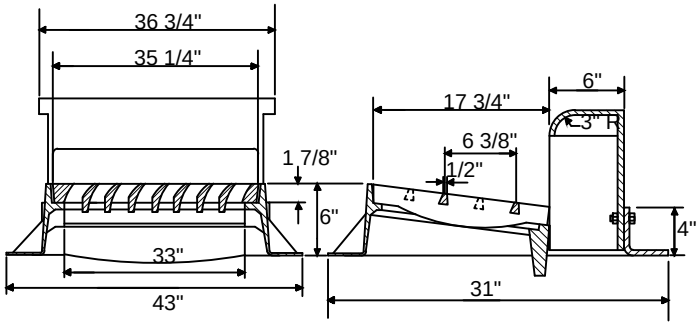
DATE: 1/24/2014

SHEET NO.: 6.02

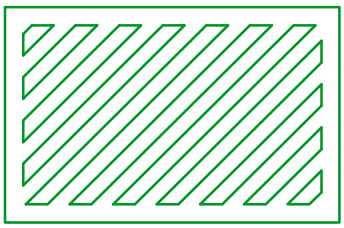
Type L Grate



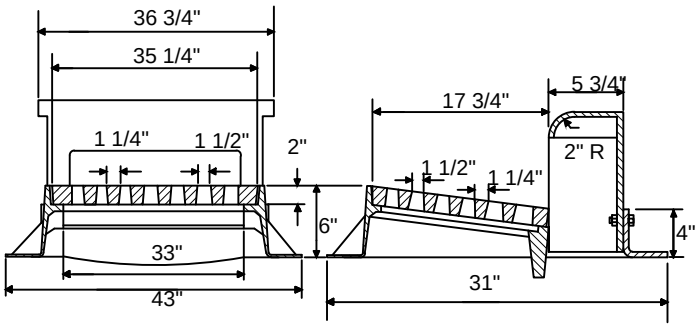
Vane Grate Openings



Type R Grate



Grate Openings



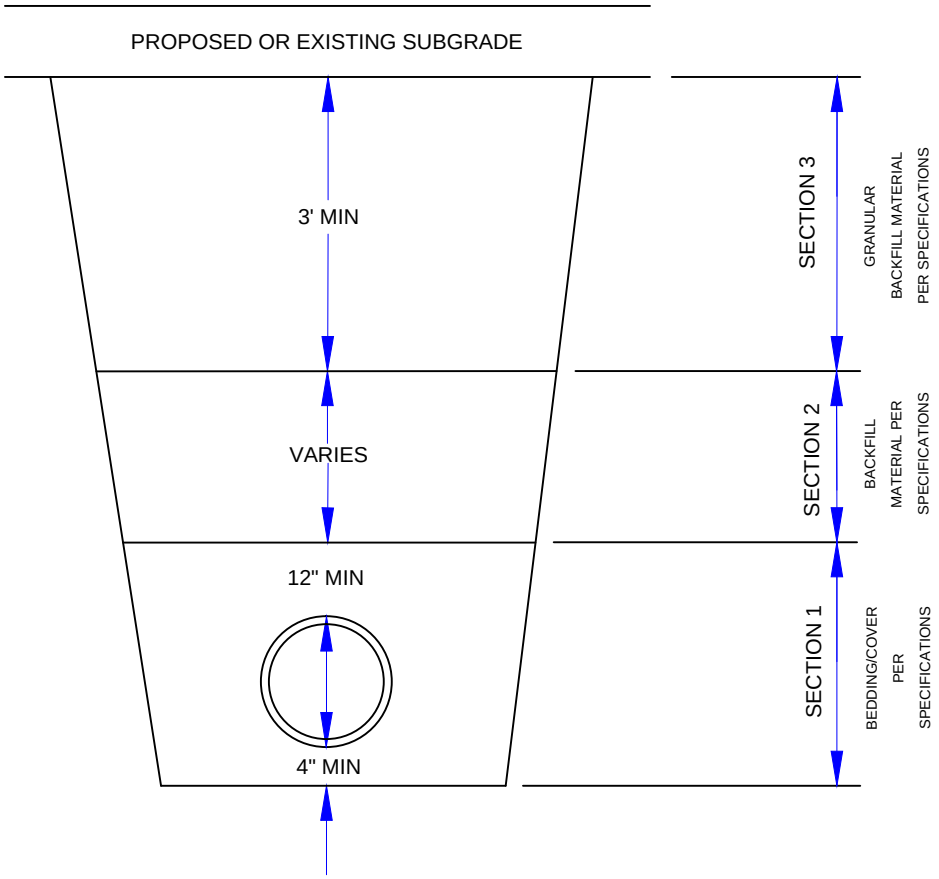
THE CITY OF Fitchburg
PUBLIC WORKS

INLET COVERS, TYPE H

STANDARD DETAIL DRAWING

DATE: 1/24/2014

SHEET NO.: 6.03



STANDARD TRENCH COMPACTION

ALL BACKFILL MATERIAL SHALL BE PLACED IN LIFTS NOT TO EXCEED 12" BEFORE COMPACTION UNLESS AUTHORIZED BY THE ENGINEER DUE TO THE CHARACTER OF THE MATERIAL AND THE COMPACTING EQUIPMENT. EACH LIFT SHALL BE MECHANICALLY COMPACTED TO THE REQUIRED DENSITY PRIOR TO PLACING SUCCEEDING LIFTS OF BACKFILL MATERIAL.

SECTION 1:

MECHANICALLY COMPACTED BEDDING AS REQUIRED BY THE SPECIFICATIONS. COMPACTION ACHIEVED WITH SMALLER PLATE COMPACTOR.

SECTION 2:

MINIMUM COMPACTION 90% MAXIMUM DENSITY. COMPACTION OF BACKFILL WITH BOMAG OR HOE-PAC SHALL NOT BEGIN UNTIL THE DEPTH OF BACKFILL MATERIAL IS TWO (2) FEET ABOVE THE TOP OF PIPE.

SECTION 3:

MINIMUM COMPACTION 95% MAXIMUM DENSITY.

THE CITY OF Fitchburg PUBLIC WORKS

SANITARY SEWER & WATER MAIN TRENCH

STANDARD DETAIL DRAWING

DATE: 1/24/2014

SHEET NO.: 7.01